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# The Australasian Bat Society Newsletter

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Number 12

March 1999

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*Rhinolophus philippinensis* (small form)  
Photo: Bruce Thomson

## 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*

Almost a year has passed since the last ABS conference and what an eventful year it has been! While all of us reluctantly resumed our various jobs and projects following a welcome, if short, Christmas break, the bats have taken no notice of our busy schedules and have continued to create controversy wherever possible. How about those flying-foxes? Recklessly destroying fruit-crops, scaring innocent school-children and spreading rampant disease at every opportunity ... one wonders if that primate ancestry may be coming to the fore at last ... ?!

As you are all aware, this countries flying-foxes have faced their worst year in over a decade. Record low native food resources (and subsequent high damage to fruit crops) during the birthing season, combined with politically fuelled hysteria about bat diseases, elevated management issues to an all-time high. As starvation claimed thousands of bats, several thousand more fell victim to fruit farmers desperate to protect their livelihood. Meanwhile, carer groups in Queensland and New South Wales were inundated with record numbers of starving orphans of whom many were beyond recovery. What better time, therefore, to revisit that tried-and-true notion of relocating flying-fox camps? Such events saw many of us rally to prevent inappropriate management strategies and to reduce the potential for further damage to bat populations. Sadly, while people are still willing to advocate band-aid solutions for with no regard for their long-term impact, we have a long way to go.

However, some progress is being made. With the formation of working groups such as the FFCC (p. 35) and local advisory bodies elsewhere, bat-related complaints are being heard and addressed. In addition, ABS policies under discussion (see Bruce's report on p. 4) will determine and strengthen our representative stance on specific issues.

Thank you to those who have contributed to another substantial and multi-faceted edition of this newsletter. Amongst some great research up-dates, conference announcements and news-snippets, Elery Hamilton-Smith has kindly provided an historical account of the birth of this newsletter (p. 13) and of the evolution of bat research in this country. Makes one proud to be a part of it! And finally, I think I am getting the hang of this editing business now. However, it would be great to see a few more humorous bits being submitted to brighten up these pages. If you have any cartoons, illustrations or photos (eg: funny fieldwork snaps), why not share them with everyone? And as for those of you perusing these pages blissfully unaware of how time-consuming even the most rudimentary editing task can be, I have this little tip: One space after a comma, two spaces after a full-stop.

Happy Batt(l)ing!!

**Nicki Markus**

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## ***President's Report***

The Executive and, I am sure, many ABS members have had a very busy time since our last newsletter and much seems to have happened in the world of bats. In Queensland, the Queensland Parks and Wildlife Service has made some money (approximately \$46,000) available for the protection of a number of old mine-sites in northern Queensland which are known to contain threatened species, one of these being the Large-eared Horseshoe Bat. The Service has also commissioned the development of a strategy paper to locate and protect mine roost-sites throughout the state and so it would appear that their commitment to this work is on-going. The Queensland Department of Mines and Energy is also enthusiastically behind the project and in recent days, the NSW National Parks and Wildlife Service has also indicated its interest in establishing a similar program in that state.

The long awaited National Bat Action Plan is now nearing completion. The BAP editorial panel and people at Environment Australia, notably Barry Baker, have been working tirelessly on this very important document and final amendments are due to be made in late February, with publication presumably fairly soon thereafter. The BAP will be a critical document because it will focus research and priorities for our bat conservation energies.

On quite a different note, we were particularly pleased to hear that Les Hall has now recovered from quite a serious illness which he first developed en route to the International Bat Conference in Brasilia. He has now been pronounced 'fit as a mallee bat' and is back into the fray.

We also had quite a good response to our call for volunteers to participate in the development of ABS policies. In total we had 24 people volunteer (excluding members of the executive) with a number of these indicating their interest in more than one issue. At the present time, we envisage that about four subcommittees will be set up and we are in the process of appointing people to coordinate these. All members who volunteered will be receiving information shortly. Our executive has discussed the process of policy formulation at length and we do feel that it is a vital first step if we are to truly represent member's views on a whole range of bat conservation issues. The executive is well aware that many people want to see the ABS assume a greater advocacy role in conservation issues - immediately. However we are also aware that there is quite a diverse range of attitudes and opinions amongst members and it is felt that we do need to go through this participative process in order to empower members and to ensure that our advocacy is balanced and truly representative of its members.

Having said that, I have to admit that we have pre-empted our policy development for flying-foxes somewhat, with the production of a brochure covering a broad range of conservation and disease issues for these animals. The brochure is based on one that was developed by the Central Health Unit, Rockhampton, and all disease information was endorsed by Queensland Health. The artist Carmen Beesley Drake, who provided artwork for the original Queensland Health brochure, has very generously allowed us to use the same art on the front of ours, and we greatly appreciate her help with that. Hopefully the brochure will provide the general public with a more balanced view of flying-fox issues. A copy of the brochure is enclosed with this newsletter.

**Bruce Thomson**

## *Research Articles and Reviews*

### **On seasonal breeding in Australian Flying-foxes, with August observations on a maternity camp of *Pteropus scapulatus* in northwest Queensland**

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#### ***Introduction***

Most species of chiroptera appear to be seasonal breeders. There are several quite distinct questions that one may ask about an apparent seasonally breeding species.

- (1) Is it truly a seasonal breeder, in that births in any given population occur at essentially the same time each year?
- (2) What environmental factors led that species to evolve the [genetically inherited] physiological mechanisms whereby births always occur at a particular season?
- (3) What external [environmental] cues and internal [genetically inherited] physiological mechanisms enable that species to maintain that timing of births from year to year, or at widely separate sites with very different environmental conditions and cues?
- (4) To what degree does birth season vary from year to year, or from site to site? Precise information on the nature and degree of such variation can help provide answers to (1) and (3). Without time-travel (2) is not open to experimental verification, only hypothesis.

It has long been known that flying-foxes (*Pteropus* spp.) show marked seasonality of breeding, even when living at or close to the equator (Baker and Baker, 1936; Marshall, 1948). However, precise data describing such seasonality are sparse, and the factors which regulate seasonality remain an enigma (O'Brien, 1993). Probably the most precise quantitative data to describe seasonality of breeding for any free-living bat anywhere in the world are those provided for Australian flying-foxes by our various flying-fox carer groups. A preliminary analysis of some of these data was presented to a Symposium on Seasonal Breeding at the 1997 meeting of the Australian Society of Reproductive Biology (Martin, 1997). A facsimile is reproduced on p. 10, by permission of the ASRB. A brief account of some of these data had been presented previously to the ABS at its Naracoorte meeting (Martin, Collins, Handsman, King and Luckhoff, 1996).

The data show that, in Brisbane, there is little difference in the timing of births between captive and free-living *P. poliocephalus*, or between free-living *P. poliocephalus* and *P. alecto*. These records (data not shown) also indicate that there is very little difference in the timing of births from year to year. Geographically, *P. poliocephalus* shows no plasticity in seasonality, with cumulative birth frequencies for Sydney, northern NSW and Brisbane super-imposed. However, the closely related *P. alecto*, does show some plasticity, with birth season becoming progressively earlier in more northerly populations. Interestingly, there is some evidence that Northern Territory *P. alecto* give birth significantly later than more southerly populations, and also that birth season may vary annually; these variations have been linked with seasonal differences in food supply (Tidemann and Vardon, personal communications).

The question of how seasonality of breeding is regulated in Australian flying-foxes is complicated by the long-distance movements of the animals, with consequent mixing of gene-pools and blurring of environmental cues by rapid changes in environmental conditions. In no case are such factors more extreme than *P. scapulatus*. This species has a distribution which overlaps those of all the other Australian flying-foxes; from Victoria, up the east coast, across the top-end and down to Shark Bay in the West, and into inland arid areas (Hall, 1987). Moreover, this is the only species known to undertake regular seasonal migrations, traveling south in late spring/ early summer and returning north in late summer/autumn. Around Brisbane, *P. scapulatus* camps have always disappeared north by late April. Few *P. scapulatus* neonates come into care, so there are no birth data comparable to those for *P. poliocephalus* and *P. alecto*, and remarkably few observations on births in the wild. Indeed, Ratcliffe (1931) and Nelson (1965) considered that births occurred when the animals were dispersed from camps.

In captivity, *P. scapulatus* caught in south-east Queensland and Northern New South Wales give birth in May-June, approximately 6 months out of phase with the other two species (Martin, Kennedy, Little, Luckhoff, O'Brien, Pow, Towers, Waldon and Wang, 1995). This timing is compatible with the few earlier field observations made by Ratcliffe (1931), Nelson (1965) and Prociv (1983). Births may be earlier in the Northern Territory as Vardon, Simpson, Sherwell and Tidemann (1997) reported for a large colony at Mataranka Hot Springs in 1995 - the first time births had been recorded there. Newborn were first observed on 17th April; percentages of females estimated to be with young, or late pregnant were respectively, 72.1 & 18.6 on 30th April, 52.9 & 32.4 on 14th May [the figures could reflect colony heterogeneity or a newly arrived cohort of late-pregnant bats] and 95.8 & 0 on 4th July. These data define the birth season in that colony and that year remarkably effectively. I urge any ABS member who is aware of a winter *P. scapulatus* maternity camp to attempt to record such data for publication in our Newsletter.

My own limited first-time observations on a *P. scapulatus* maternity camp are recorded below.

### **Observations**

In July-August 1998 I spent some weeks scrub-bashing in the Musselbrook National Park and adjoining resource area in NW Queensland, just south of the Gulf of Carpentaria and a few km east of the NT, 4WDing extensively in a Landrover Defender, camping by the billabongs, canoeing, riding a mountain bike and walking into the more inaccessible rocky spots - though it's all rocks up there. And a sort of wilderness - apart from the cattle, feral cane-toads, introduced weeds and the depredations of miners -

who actually make a relatively small contribution to the ecological disaster-zone that we call Australia, compared with the farmers who, [from observations made on this and many other trips around Australia] continue to clear wall-to-wall and horizon-to-horizon, including the roadside verges along their property!

On a happier note, while at Murray Springs, close to the NT border, I spent some time on 15th August 1998 using a 90mm telescope to observe a small [~75,000?] maternity camp of *P. scapulatus* in an area of *Eucalyptus*, *Melaleuca* and *Pandanus*, beside a small creek/billabong, at the bottom of a broad gully. The trees were much damaged - large branches broken off or stripped of leaves. An adjoining stand of very large *Melaleuca* was unoccupied during the day and apparently undamaged, but appeared to serve as a creche for young after the fly-out. The surface of the creek was completely covered with small fragments of paper-bark!

Even though day-time air-temperatures were high [ $>30^{\circ}\text{C}$ ], with brilliant hot sun, many animals [including mums-with-young] were roosting high up and unshaded - though with the usual thermo-regulatory wing-flapping; and even up there, animals roosted close together - spaced-in rather than spaced-out. Lower, more shaded areas had "cones" of bats, groups of 30 or more, all seeming to be hanging from the one spot. I had previously only observed such "cones" of *P. scapulatus* on cold days, and had thought them to be a thermo-regulatory adaptation to the cold - clearly they are not simply that. Indeed, such roosting behaviours in such conditions pose questions of how such relatively small animals do maintain body temperature ie., preventing overheating and maintaining fluid balance. Perhaps wing-flapping provides sufficient heat loss by radiation and convection without significant water loss, and "coning" could reduce heat gain from external radiation.

Though camps are usually beside water, there is [and was here] no apparent flying down to drink during the day. Nor did the bats have an early fly-out - always an indication that they are hungry. Indeed, the fly-out was disappointing in that the bats did not leave in any numbers until the light level had fallen so much that individuals were difficult to distinguish by naked eye. Also there was no swirling up from the camp prior to columns forming, as we have seen with some *P. scapulatus* camps in SE Queensland. Instead the bats went out low, in one direction [NW], streaming around and below the large *Melaleucas*, where there was much noise and coming and going as mothers creched their young. The stream kept low, for no bats appeared over the sky-line against the still-bright twilight zone - which I scanned continuously with the 90mm telescope.

God knows what the animals were feeding on, there was little or nothing in blossom over the broad areas we explored. Nevertheless, the bats all appeared to be happy and healthy, with no apparent sign of disease, and with most adult females suckling large well-developed young or with large young hanging free beside them but close, or completely independent. There were no small or new-born young or obviously late pregnant females. All this indicates that most births occurred in late May/ early June, as in SE Queensland, and in our captive colonies (Martin *et al*, 1995).

### **Discussion**

These observations indicate that births of *P. scapulatus* do occur when the animals are aggregated in camps. The apparent timing of births in these north-west Queensland *P. scapulatus* is compatible with birth times recorded by previous authors, including Vardon *et al* (1997) for *P. scapulatus* in the

Northern Territory. They also serve to emphasize the paucity of precise birth-time data for this species. ABS members please note and respond - we need to fill in the gaps for most of this species' range. Mind you that is also true for *P. alecto*.

I have long been intrigued by *P. scapulatus* breeding approximately 6 months out of phase with *P. poliocephalus* and *P. alecto* [noting that this may not hold true with respect to *P. alecto* in the top-end] and have often wondered what environmental factors might have led *P. scapulatus* to evolve to give birth at the start of winter - it can get very cold in Central Queensland in winter. One clue offered itself as I drove up to Townsville in July 1996 for an Australian Ecological Society meeting - where *Melaleuca* remained, most was in blossom; one could imagine that before European settlement and clearing there must have been masses and masses and masses.....! In the context of births in winter, camps-beside-water and births-within-camps make sense, with less extreme cold beside water, warming of the camp by the large biomass of bats and thermoregulatory heat conservation by close roosting and clustering. Again, such speculations would be greatly aided if we could fill in the blanks on the map with a detailed distribution of *P. scapulatus* maternity camps. If all such camps fall north of the tropic of Capricorn, then *P. scapulatus* is truly a "tropical" mammal.

Many temperate zone seasonally breeding mammals use changing day-length [photoperiod] to time reproduction, and there are numerous examples where experimental manipulation of photoperiod alters breeding seasonality. Laboratory experiments with male *P. poliocephalus* indicated that the timing of the seasonal cycle of testicular growth was sensitive to altered photoperiod (McGuckin and Blackshaw, 1992). In contrast, captive male *P. scapulatus* challenged for several years by altered photoperiod showed no significant change in testicular seasonality (O'Brien, Martin and Curlewis, 1993). Comparable long-term photo-period experiments on *P. alecto* (O'Brien, unpublished) remain to be interpreted. While rainfall and food-supply are often cited as predictive regulators of seasonality, there is little experimental evidence that they are immediate (proximal) regulators - note here the problem for animals like flying-foxes, with a long pregnancy. Apropos Australian flying-foxes, O'Brien (1992) suggests that endogenous rhythms play a major role.

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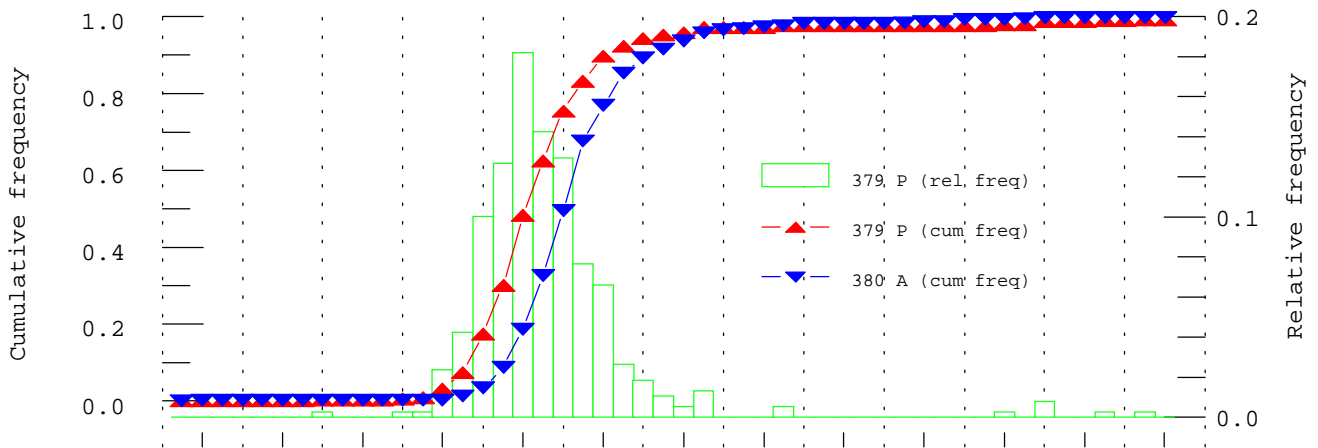
## What regulates seasonal breeding in Australian flying-foxes (genus *Pteropus*)?

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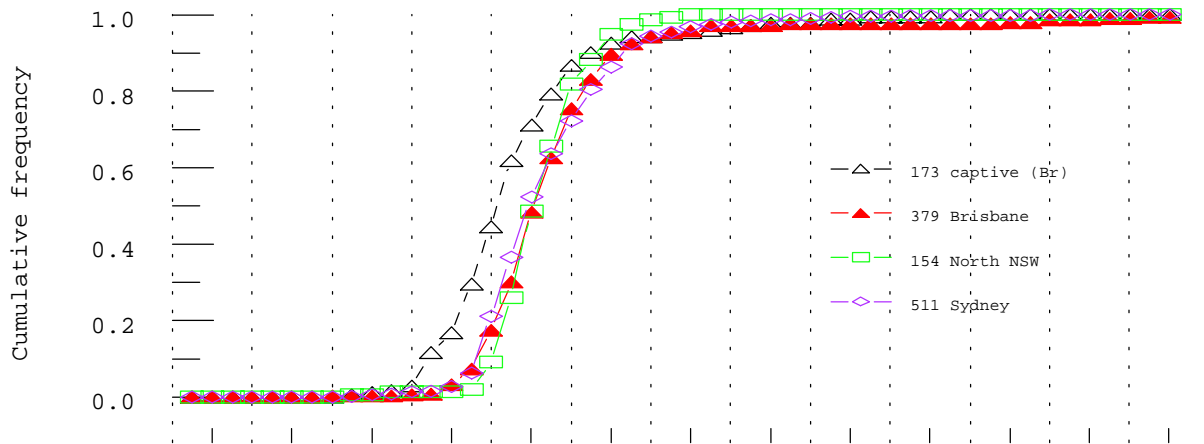
**Introduction** Seasonal breeding, the adaptation whereby young are born at a time optimal for their survival, is regulated in many temperate-zone species by changing photoperiod. This appears not to be so in tropical species. Here, seasonal rainfall is an oft-suggested timer, but actual environmental cues remain unknown. Flying-foxes, tropical in origin, breed seasonally, with conception and parturition peaking at different times of year (Martin *et al.* 1995). Australian species span a wide range: *P. poliocephalus* (“polios”, subtropical-temperate) and *P. alecto* (“alectos”, tropical-subtropical) mate in autumn, deliver in spring, yet *P. scapulatus*, [whose range overlaps the others] mate in spring and deliver in autumn.

**Methods** To gain insight into factors which might time reproduction in *Pteropus*, frequency distributions of births of polios and alectos were calculated from birth-date [captive colonies, Brisbane], or date of entry-into-foster-care of new-born young [flying-fox conservation groups].

A: *P. poliocephalus* (P) & *P. alecto* (A) births in Brisbane (Br)



B: Births in captive and free-living *P. poliocephalus*



C: Births in captive and free-living *P. alecto*

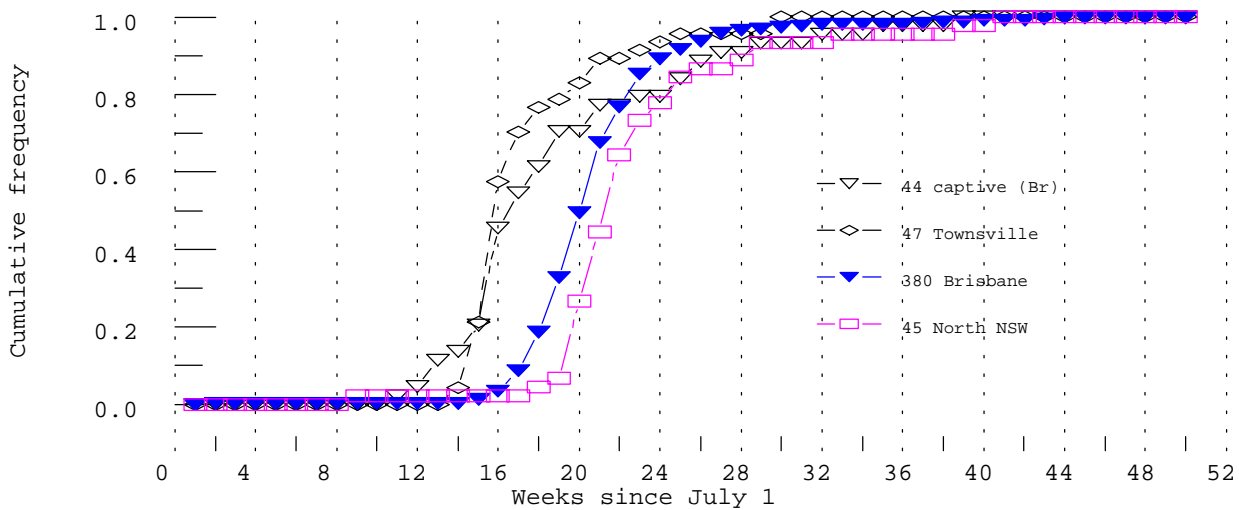


Fig. 1 Frequency distributions of flying-fox births.

**Results** Although birth season is usually shown as a relative frequency distribution [Fig.1A], cumulative frequencies distinguish better between onset of births [OB=first inflexion] and subsequent birthrate [BR=slope] facilitating comparison between species etc. OB differs by 2-4 weeks between wild polios and alectos in Brisbane and northern NSW, but BRs are similar; whereas captive polios and alectos have comparable OB and BR, with OB earlier than in the wild [Fig.1A-C]. OB and BR do not differ in polios from Brisbane to Sydney [Fig 1B]. In contrast, OB is progressively earlier in more northerly alectos, though no more than in Brisbane captives [Fig.1C]; the small alecto samples do not allow conclusions about changes in BR.

**Discussion** Timing of the *Pteropus* birth season is remarkably robust, with no geographic variation in polios, and little in alectos. That there may be real differences between these species is remarkable, since they can interbreed to produce fertile young. Differences in the OBs of sympatric captive and wild populations also indicate that there is environmental plasticity, though the differences may simply reflect slightly shorter pregnancies in captives [length ~28 wk] plus small differences arising from recording methods.

In both captive and wild polios, male sexual-function peaks in March-April. Females copulate repeatedly and often, starting in February, with plentiful sperm in vaginal smears from early March - yet there is no conception until mid-late April. Thus, females are not simple reflex ovulators. Attempts to advance conception by manipulation of male/female photo-period have failed. In contrast, when captive females are first placed with males in July, conception appears to occur within days, with births following in January-February. While length of pregnancy may vary slightly, hormonal and histological studies give no evidence of prolonged delays in implantation or post-implantation embryo-development.

**Conclusions** I suggest that the temporal distribution of births largely reflects that of conceptions, OB being timed from when females are first capable of conception, subsequent BR reflecting the rate at which they then mate and conceive.

The crucial question is thus “what environmental factors determine the time at which females can first ovulate”?

**Thanks to:-** FJ Martin for finalising the records; Linda Collins, Dinah Hansman, Juleen King & Helen Luckhoff, and the hundreds of *Pteropus* carers they represent, without whom this study would not be; the ARC for many years support of my flying-fox research.

**Reference** Martin, L, Kennedy, JH, Little, L, Luckhoff, HC, O'Brien, GM, Pow, CST, Towers, PA, Waldon, AK & Wang, DY (1995) The reproductive biology of Australian flying-foxes (genus *Pteropus*). *Symp. zool. Soc. Lond.* **67**, 167-184.

## Ecology of the black flying-fox *Pteropus alecto* in the seasonal tropics of the Northern Territory: Resource tracking in a landscape mosaic and role in seed dispersal

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### *Introduction*

Radio telemetry was used to investigate roosting and movement patterns of the black flying-fox *Pteropus alecto* in the seasonal tropics of the Northern Territory. Sixteen *P. alecto* were tracked during a 12 month period to 34 roosts and were recorded at 49 foraging sites. *Pteropus alecto* moved roosts seasonally, from bamboo and mangrove habitats in the dry season to rainforest in the wet season. All radio-collared male and female *P. alecto* roosted in rainforest during the major part of the wet season. Climatic influences may be responsible for this behaviour with rainforest perhaps providing stable temperatures and shelter from the monsoonal rains. There was a significant seasonal difference in the distances moved by females between successive roosts. There was an association between roosting and foraging habitat: *P. alecto* roosting in bamboo and mangroves foraged predominantly in woodland, *P. alecto* roosting in rainforest foraged in *Melaleuca* spp. and rainforest habitat. Females covered greater distances from roosts to foraging locations than did males. Distances from roosts to foraging sites were reduced for males and females during the build-up season (September to November) and wet season (December to April). Seasonally, foraging habitat shifted both floristically and spatially with no significant difference between the sexes.

The movements of one female *P. alecto* were recorded at hourly intervals over three consecutive nights at the beginning of the wet season. Movement patterns were very similar between nights and over these three nights she foraged in at least 7 distinct locations. The total distance moved per night was 15.5 km to 19.9 km including return distance to the roost, assuming straight line movements. Most foraging was done less than 6 km from the roost. The ratio of total distance moved with respect to mean roost to forage site distance was similar between nights (3.8 - 4.3), suggesting that a single roost site to forage site distance recorded during this study can provide an index of total foraging distance.

Radio-collared animals selected foraging sites that were richer in flower or fruit resources when compared to floristically similar sites. *Pteropus alecto* moved throughout the landscape in response to the flowering and fruiting of a number of plant species in different habitats. *Pteropus alecto* foraged only in canopy or emergent trees and foraged on the flowers and fruit from 23 species in 11 families. It appears that *P. alecto* has sophisticated strategies for tracking the availability of patchy resources that occur in reasonably high densities.

The likely probability of ingested seeds being dispersed between rainforest patches was assessed. When gut transit time for seeds, wet season distances and movement patterns for radio-collared *P. alecto* are incorporated into a seed dispersal model, it becomes evident that *P. alecto* is an important disperser of seeds between different rainforest patches.

*Pteropus alecto* roosted or foraged in six major habitat types in the study area suggesting a flexible strategy for exploiting patchily distributed resources in the seasonal tropics of northern Australia. Land tenure status identified for foraging and roosting positions recorded for *P. alecto* emphasises the lack of protection for habitats used by this species. Only 3% of foraging or roosting positions were recorded in any type of conservation reserve. *Pteropus alecto* requires a range of habitats over a large area for roosting and foraging requirements. No matter how well placed conservation reserves are, *P. alecto* will be substantially dependent on differing types of off-reserve land. Therefore, we need to develop and implement off-reserve land management practices that take into account *P. alecto*'s seasonally distinctive and sometimes contrasting requirements for roosting and foraging habitat.

### ***Further reading***

Palmer, C. (1997). Ecology of the black flying-fox *Pteropus alecto* in the seasonal tropics of the Northern Territory: Resource tracking in a landscape mosaic and role in seed dispersal. M.Sc. Thesis. Northern Territory University.

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## Reports

### Keeping in Touch – Beginnings of the ABS Newsletter

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In 1997, Terry Reardon commented on potential future directions for the ABS, and in the course of doing so, pointed to the role played by the various bat newsletters. He suggested to me that I might tell at least some of the story of the first newsletter, so here I am.

I'll start by going back a little earlier. At Christmas 1955, I paid my first visit to the wonderful maternity site at Naracoorte - one of the most exciting caves I have seen, even to this day. At least, being in South Australia, Wood Jones' book and acarologist Herbert Womersley were both able to inform me of the identity of the bats, but little else. (In due course, I was to find out that in those years, many professional mammalogists mis-identified bats) I decided that it would be worth while to learn more about the natural history of bats, and for a start, this consisted of observation and various futile attempts to discover more. I did collect a number of parasites, and Womersley, Domrow and others described these.

In December 1956, the Australian Speleological Federation came into being, and I started trying to enlist other cavers into the task of trying to understand more about our bats. Then through the late Jack Hood, ornithologist extraordinaire and a Naracoorte resident I met Warren Hitchcock, then co-ordinator of the Australian Bird-banding Scheme, and we started talking about bat-banding. In particular, I found that George Dunnet and then David Purchase had tried a few experiments in banding at Wee Jasper. Barbara Dew from Sydney had expressed an interest in using banding to support her studies of malarial plasmodia in bats, then Peter Dwyer arrived from New Zealand and immediately sought to use banding as basic method in his PhD studies of bats. John Edge of Warrnambool, a long-experienced bird bander and Associate of Jack Hood, also expressed a keen interest. So, on July 1st, 1960, the Australian Bat Banding Scheme came into being, under the auspices of the CSIRO Bird-banding office, by now with David Purchase giving special attention to bat-banding and later succeeding Warren as co-ordinator.

Two issues emerged and David enlisted my help. The first was that we had no overall field guide to identification of Australian bats. So, I was asked to produce one, dealing only with cave-roosting species at this stage. This was a bit of a challenge as at that stage, I had not even seen many of the species concerned. But fools rush in . . . and with the help of people like John Calaby, Basil Marlow, Peter Aitken and Hobart Van Deusen, I produced *Australian Cave Bats: A provisional guide to identification* (January 1964). It was an attempt to overcome the problem of getting reliable identification - and apparently served some people very well over that early period of developing bat studies in Australia.

The second was that it might be a good idea to have a newsletter as a means of keeping in touch with batty people and trying to interest others. So, again . . . the first issue of *Australian Bat Research News* appeared in June 1964. This was aimed at several audiences at the one time - those already involved in bat studies, cavers who happened to see a lot of bats, and professional zoologists who might be enlisted into bat studies. Again, the late John Calaby was an invaluable encourager and advisor. In particular, John suggested that because bat studies were so much in their infancy, the newsletter should purely serve as an informal communication and not publish serious papers. This policy was maintained, and I believe that the clarity of the Newsletter's role served it extremely well.

(Hopefully, the ABS will more adequately recognise the recent demise of John Calaby. But I would like to make the comment that I count myself extremely fortunate to have known John and been encouraged, supported and helped by him. His encouragement to many of us, both amateur and professional, was one of his great contributions to Australian Zoology).

I guess, like many newsletter editors, I wrote more of it than was desirable, but gradually others came to contribute - even if they didn't write anything, I would put in notes of what they told me in passing. Every issue had lots of current literature references - I tried to make the Australasian listing a comprehensive one.

Looking back over my copies, it is interesting to see the gradual entry of new names into the field. Apart from the initial groups of banders mentioned above, others appeared quite rapidly, roughly in the following order : John McKean, Les Hall, John Nelson, Meredith Clark, Bob Green, Mark Ryan, Ken Simpson, Stephen Davies, Lord Medway (now the Earl of Cranbrook), Bill Price, T.C. Maa, and Andy Spate. Then Issue 6 included a directory of 39 researchers interested in or working on Australian bats. Later issues saw an accelerating number of new names appearing.

The content ranged over various minor observations of interest, regular conservation news and notes, debates over taxonomic and nomenclatural problems, news of interesting research and other discoveries, and the regular literature listings. My editorship survived until the end of 1974. By that time, the work pressures of my professional responsibilities (as a sociologist and social researcher/planner) had expanded enormously, and I could no longer do justice to my interest in bats. After a bit of a lull, I was delighted when Greg Richards took up the task in 1979.

People tell me that the Newsletter did help to develop their interest in bat studies, and even formed what amounted to a postal community of bat workers. Certainly, I found that my task was a truly enjoyable one, and that I made many friends, many of whom remain friends to this day.

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## Why educate people about bats?

Nancy Pallin  
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My main motivation for being involved with bat conservation and especially education is to do my bit for keeping our world functioning for the future. Many of the young people I know are beginning to produce the next generation. It is a very scary thought that 50 years from now the environment could be so degraded that Australia could not feed its people. However, we could change direction.

I believe we must explain ecosystems, how they work and what happens when they are damaged in ways people can understand, so that they then feel motivated to make the appropriate changes in their lives.

So bats become our mascot for ecological function.

Educating people about bats needs a positive, even optimistic tone. Our presentations must convincingly explain how bats help ecosystems to work. They must also replace fiction with fact, fear with understanding and loathing with appreciation.

ABS people know that a close-up look at a real live bat can't be beaten for achieving a turn around in attitudes. Everyone who has shown bats around knows the great moment when someone with anti-bat beliefs slowly edges closer to have a better look and finally to ask questions. It is a slow process - one person at a time.

We must be more efficient in spreading the word. In the present climate of multi-media and superb visual presentations, bat presenters need to be up with the best of them. I would like to see the ABS produce some cheery looking graphics which explain pollination and seed dispersal by flying-foxes and insect consumption by microbats. Perhaps we could talk to graphic design schools to help create some effective visuals accurately depicting real live bats. Then we could talk to Australia Post about producing some more bat stamps. And we could produce some posters or get Environment Australia to pay for printing of our accurate posters. And .....

What do you think? Who will help? Who do you know who could help?

### ***Flying-fox Colonies - a simple statement:***

*Flying-fox colonies are found near water, either creeks, rivers or estuaries. Flying-foxes navigate by sight and follow landforms such as rivers between their camps and feeding grounds.*

*They are not fussy about the species of trees in which they roost. Camps occur in mangroves, rainforest and especially in large figs, casuarinas, eucalypts, turpentines Syncarpia glomulifera and bamboo. Flying-foxes like to roost together. Preferably roost trees are tall, with varying heights, so*



*that some flying-foxes can act as lookouts from the higher ones. They roost on bare branches in the sun and in the shade of foliage during hot weather. Flying-fox colonies move about within their colony site.*

*The numbers of flying-foxes using a camp changes irregularly. The amount of food available to them in the surrounding area affects the numbers in residence at any particular time. When plentiful food becomes available in another area, flying-foxes from many camps move to take advantage of that food while it lasts. Flying-foxes feed on nectar and pollen from the flowers of many kinds of eucalypts, paperbarks and banksias. They also extract the juice from rainforest fruits, especially figs and lillipillis.*

*Many flying-fox camps known in the past no longer exist. Their forest was removed for farming or housing. Today, flying-foxes have fewer options for camp sites than in the past. Many flying-fox camps are in small forest reserves, which are remnants of what were once large areas of forest. Where humans live near these reserves, conflicts arise between humans and flying-foxes about who should move. Humans have caused this situation and must find the solutions.*

*In eastern Australia, ten hectares is a minimum size for a flying-fox camp. However, for the colony to move about within the site, and for the forest to recover from use, twenty hectares is necessary to provide buffer zone (pers. comm. John Stockard of Wingham). Where flying-fox camps are in small forest remnants, establishment of additional forest adjoining the remnants will be vital to provide sufficient roosting habitat in the long term.*

Who wrote this simplistic stuff? I did.

Because I believe the ABS needs to have some simple summaries of what we know about bats of various sorts to publish - either on leaflets, the website or portable displays. My idea is that we sort out at a simple level an agreed set of statements. The above are necessarily simplistic so that ABS can make a start on preparing some educational information. How much of it can you agree with. What else should be included?

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## German church group wins prize for work with bats

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I report to you some news about a German church group which won a prize for work with bats. The background to this information is that in July/August 1997 the Sandersons hosted German exchange student Antje Duppel (aged 15) in Adelaide - Antje attended Blackwood High School and did some sight-seeing. In return, 16 yr old Aaron Sanderson was hosted by the Duppels in Heimsheim (near Stuttgart) in Germany in December 98 - January 99 (attending high school and sight-seeing). As a result of these exchanges we have had considerable email correspondence with Antje's mother, Ursi, who seems to be involved in all kinds of activities in her district, including being the editor of her church newsletter.

Ursi sent us the November 98 edition of her church newsletter ("Rund um den Kirchturm") which contains various notices, news items, Advent Service schedule, plus a 1½ page article (by Andreas Knapp, in German) on the batwork, including pictures of 2 species *Plecotus austriacus* (Fliegende Langohrfledermaus - a long-eared bat) and *Pipistrellus pipistrellus* (Ausgewachsene Zwergfledermaus), plus pictures of modifications made to the church to make it a possible home for bats. One of these pictures shows where the netting covering a slot in the bell-tower has been rolled back to allow bats to enter, the other picture shows a board placed under the eaves to generate a slot for bats to roost in.

I am indebted to a German exchange student at Flinders University, Alex Otterbach (working on native bees with colleague Mike Schwarz) for a rough translation of the article, whose substance is roughly as follows: The Heimsheim Evangelischer Church, in conjunction with green group BUND has entered an environmental competition called "ABEL soll leben" (ABEL shall live) open to churches in the Ludwigsburg region. In 1995 they placed roosting boxes for owls in the church, and in 1998 decided to make the church more friendly towards bats (as described above), with modifications carried out by the church youth group. Part of the aim of the project was practical (providing new potential homes for bats) and part was educational (to help the people in the church understand that animals in the environment need places to live). The latest message from Ursi (13 January 99) indicates that they have won an award for their efforts -

"We are very proud that our church parish has won an oecological award for our bat project. On February 28<sup>th</sup>, the bishop is coming to Heimsheim to celebrate the service and to present the prize. Such an effort for lifting some tiles and putting on some boards! Now we have four kinds of bat in Heimsheim and they have their winter quarters not only under the church roof, but also in the old castle where we have an always opened window for them. Greetings to you all. Ursi."

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## An Affordable Infra-red Video Camera

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The increasing use of compact surveillance cameras for monitoring human behaviour has meant that this equipment is now much more readily available 'off-the-shelf' and at a much more affordable price. Video surveillance has an enormous potential in ecological research, and in combination with infra-red lighting provides opportunities for a range of potential studies on nocturnal animals including bats.

Motivated by the excellent footage on view at the Naracoorte Conference (1997), the bat group at the University of Ballarat has been keen to investigate video applications in relation to observation at roost sites. Browsing through a Dick Smith catalogue a few months ago (1998-99 catalogue, page 154) we noticed a surveillance camera advertised at a modest \$159.00 incorporating seven in-built spot infra-red LEDs for night viewing. We purchased the camera in kit form and assembled it without difficulty.



The camera within the unit is compact, approximately 2 cm in diameter and is easily focused by rotating the lens. Focal length ranges from infinity down to approximately 5 cm. The unit including the infra-red LEDs is built into a sturdy case including a microphone, video out, audio out, RF out to allow the unit to be attached directly to a monitor and power supply jacks. Additional to the camera itself are video and power supply cables which are needed to record footage onto video tape.

On trialing the video camera at night using the infra-red illumination, the camera worked extremely well indoors, where the infra-red light was able to reflect off solid objects. When placed outside, the infra-red light tended to be soaked up, particularly in open areas where no solid objects were present to reflect the light. It was suggested that more infra-red light was required to overcome this problem when recording outdoors, so an infra-red spotlight was made up as an additional external light source. Twenty-one infra-red LEDs set in series, (grouping 3 x 7 so as not to use more than 12 volts) provided an adequate light source up to a range of 5 m outside.

The equipment was field tested at Nanya Station in far western New South Wales during radiotracking work targeting *Nyctophilous timoriensis* and *Chalinolobus picatus*. A *Chalinolobus gouldii* female was tracked to a *Eucalyptus dumosa* (Dumosa Mallee) situated on a dune 2.1 km east from the point of capture.

The roost consisted of a dead spout which extended into a living portion of one of the trees limbs approximately 15 cm in diameter. The video camera and infra-red spotlight, powered by a 12v motorcycle battery, were fixed to a long wooden stake and positioned 50 cm away from the roost entrance, approximately 2.5 m above ground level. A video camcorder was linked to the infra-red video camera enabling footage to be recorded on the camcorders video tape, as well as using the viewfinder to focus the infra-red video camera on the roost entrance. Two video cables were needed to make this link, one for the video picture, the other for the audio sound, the connection simply being a link between the video and audio out of the infra-red video camera, and the video and audio in of the camcorder. An Anabat detector could be plugged into the external microphone jack of the camcorder if ultrasound is desired. However, the microphone on the infra-red video camera will interfere with the Anabat detector. Therefore if using this combination the audio out cable from the infra-red video camera should be unplugged.

Eighteen bats were observed exiting the roost between 1850-1920 hrs on September 15 1998. The infra-red video camera worked well and captured footage for all bats exiting the roost site. The resolution of the video when played back is extremely good, however bats are very quick and only a second or two can be seen of a bat in flight. When viewing the video all bats leaving the roost seem to open their wings upside down, which may suggest that a distance of free-fall is required to gain enough distance from the roost to avoid injury before opening their wings. The bitmap images taken from the footage were a little blurred. This is due to the speed of the bat and the limitation of the number of frames per second sampled by the camcorder.

For the price and simplicity of the infra-red video camera purchased the unit works extremely well with the additional infra-red light source. Clearly the camera has a wide range of uses both for bat work and in other fields of fauna research.

Apart from infra-red video surveillance of bat roosts, the Centre for Environmental Management at the University of Ballarat has an ongoing interest in bat foraging ecology and roost site characteristics having been involved with bat surveys in far western New South Wales for the past 10 years. We have numerous Anabat recordings for all of the species of bats found in this region including, *Chalinolobus picatus* and *Nyctophilus timoriensis*. If anyone would like more information on this video camera, Anabat calls, or our research in New South Wales please contact any of us at the above address.



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## Nomenclature of *Tadarida australis* (Gray 1838)

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The decision by Mahoney and Walton (1988) to recognise the name *Nyctinomus* as the senior synonym to *Tadarida* has been met with mixed reaction amongst Australian bat biologists. Examination of the Australian bat literature since 1988, reveals that while the name *Nyctinomus* has been widely adopted for the species *australis*, several authors have resisted the change and have retained the use of *Tadarida*. I report here on the results of my inquiry into this nomenclatural stalemate and revisit the arguments as to why the name *Tadarida* should be used.

There are two issues which need to be considered in the quest to allocate the correct generic name to the bats we commonly know as White-striped freetail bats (*australis*). The nomenclatural issue is dealt with here first and the taxonomic issue, which addresses the generic affinities of the species *australis*, is dealt with second.

Theoretically, to decide between which of two available names has seniority should be simple matter of establishing which name has the earliest date of publication. In the present case, however, it has proved difficult to verify the publication date for one of the genera. The author and date for the name *Tadarida* is well established as Rafinesque (1814) (*teniotis* is the type species). However three dates, 1812, 1813 and 1818, have been variously attributed to the publication of Geoffroy's description of *Nyctinomus*, and since these dates straddle the 1814 date for *Tadarida*, establishing which of the three dates is valid, would determine which name has seniority.

The use by some authors, including Mahoney and Walton (1988) of the earlier dates of 1812 or 1813 for Geoffroy's description of *Nyctinomus*, appears to have been based on their acceptance of "special" pre-publication proofs of Geoffroy's manuscript, as constituting a valid publication. One of these proofs, dated 1813, is currently in the care of the British Museum (Natural History) along with a letter written by Geoffroy to J.E. Gray. Part of this letter (in French) is reproduced in Sherborn (1897) who specifically set about to resolve the date issue. In his letter, Geoffroy explains that two special proofs were made and one of them was a gift for Gray. These proofs have different page numbers to those in the publication that appeared in 1818. Interestingly, a cover note attached to the letter and proof, is dated 1812, which probably accounts for the use of that date by several authors. Significantly, Sherborn (1897) suggests that Cuvier, who would have been most familiar with Geoffroy's work, did not recognise 1813 as the description date for *Nyctinomus*. Perhaps some of the confusion lies with Cuvier himself who refers to a plate from the proofs which bore the French vernacular "Nyctinome" (Cuvier 1817). This suggests that the plates were in existence before the text of the descriptions. Sherborn (1897) concluded that the correct date of publication was 1818 (Sherborn was apparently very thorough).

Lyon (1914) investigated the matter as well. He agreed with Sherborn's argument but refers to another confusing aspect. Oken (1816) used the name *Nyctinomus*. I have not been able find this reference but presumably it did not contain a description because Lyon (1914) dismisses Oken as the first author of *Nyctinomus*. Nonetheless, several authoritative and widely available publications in the early 1900s

continued to only recognise *Nyctinomus* Geoffroy 1813 (eg Miller 1907). The issue clearly continued to be vexatious - Simpson (1945) for example addressed the problem and suggested that even if the 1813 date was proved to be correct, that application for the suppression of name *Nyctinomus* be made to the International Commission on Zoological Nomenclature (ICZN) to prevent further confusion.

Thus in a way, it was surprising that Mahoney and Walton (1988) reopened the can of worms. Their reasoning though, was not without logic. Article 29(h) of the International Code of Zoological Nomenclature refers to “separates” - these are advanced copies of a publication which could even be in different form from the final publication but providing they satisfied the criteria set down in the Code, would be acceptable as a valid publication. Thus the date of the separates, even though it may be a year or more in advance, could be considered the date of publication. It is clear that Mahoney and Walton (1988) judged that Geoffroy’s 1813 proofs constituted separates under the laws of the Code.

I put the issue of separates to Dr. Peter Tubbs from ICZN. His emphatic opinion was that the proofs would not constitute separates under the criteria set out in the Code, and he was adamant that I should publish and circulate this argument to avoid further confusion. **The ICZN recognises *Nyctinomus* as Geoffroy 1818 and therefore *Tadarida* as the senior synonym.** (Dr. Tubbs further points out that several other bat genera, including *Taphozous*, were also described in the same publication by Geoffroy [1818] and thus also have been erroneously attributed to 1813).

Given that the ICZN recognizes the seniority of the name *Tadarida*, only the taxonomic issue remains, that is, is *australis* rightly placed in the genus *Tadarida*? The most recent comprehensive taxonomic review of the family Molossidae is that of Freeman (1981). In that study based on morphological relationships, the genus *Tadarida* is polyphyletic (that is, has groups of species in the genus that are not one another’s closest relatives). Hill (1961) suggested earlier that *Tadarida* (in its broadest sense) should be split into several subgenera. If the genus was split along the boundaries suggested by Hill (1961) and Freeman (1981), to which genus would *australis* be allocated? Both authors regard *australis* as allied to a group of species that include *teniotis*, the type species of *Tadarida*. **This gives us confidence that *australis* would remain in the genus *Tadarida* if the genus was split.** Curiously, Freeman and Hill do not concur on the relationship of *teniotis/australis* to *aegyptiaca* (the type species of *Nyctinomus*). The morphological relationships derived by Freeman (1981) show *aegyptiaca* belonging to a group unrelated to the *teniotis/australis* group. If these species groups formed the generic boundaries, then *Nyctinomus* would be the senior name available for *aegyptiacus* and its allies.

The generic composition of the Molossidae still requires clarification – I know that one team (from Spain) is currently working on the problem using DNA sequence data.

### *Acknowledgements*

Dr Peter Tubbs of the International Commission for Zoological Nomenclature, generously guided me to key references, provided interpretation of the Code in relation to the issue of separates, and encouraged this publication. Thanks to Lindy Lumsden for continuing to hassle me to find an answer to the problem.

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## **An ABS project in which all members in southern Australia can participate: Does the White-striped Freetail Bat, *Tadarida australis*, migrate north for the winter?**

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Until recently, the ABS has not run projects that members can participate in. However, there are a number of potential projects that would lend themselves to the involvement of the collective strength of a large number of members. I would like to suggest one such project.

I have often had discussions with other ABS members in south-eastern Australia about what happens to the White-striped Freetail Bat, *Tadarida australis*, over winter - does it remain in the south and go into torpor, as we believe most other species of microchiropterans do, or does it migrate north? The audible



echolocation call of *T. australis* is heard regularly in Melbourne during summer. In an attempt to assess when they are active, I have been keeping sporadic records for the last 10 years on when I hear them and when I don't. During this time I have never heard them in Melbourne during winter (although I must admit that I often migrate north for some of the winter!). I usually stop hearing them in May and do not start hearing them again until September.

In an examination of the reproductive pattern of *T. australis*, Kitchener and Hudson (1982) found that copulation, ovulation and fertilisation all occurred around late August, and that there was no sperm storage over winter. This is in contrast to many other species from the temperate region of southern Australia, where copulation occurs in autumn and sperm is stored over winter until ovulation in spring (eg. Southern Forest Bat *Vespadelus regulus* (Kitchener and Halse 1978); Gould's Wattled Bat *Chalinolobus gouldii* (Kitchener 1975); Chocolate Wattled Bat *C. morio* (Kitchener and Coster 1981); Little Freetail Bat *Mormopterus* sp. (long penis form) (Crichton and Krutzsch 1987)). As *T. australis* does not store sperm, and its vesicular follicles show none of the characteristics of hibernating bats, Kitchener and Hudson (1982) concluded that there was no evidence of hibernation in this species.

So if this is the case, and if *T. australis* remains in Melbourne over winter, we should regularly hear their echolocation call. If, however, contrary to the evidence from the reproductive study, they are able to enter torpor, then on relatively mild nights in winter they should arouse from torpor and become active, and we should hear them at least sporadically. As I never hear them over winter, my theory is that they migrate north. However, in other parts of south-eastern Australia the pattern may be different - Terry Reardon says he hears them in Adelaide occasionally over winter.

Other species of molossids, such as the Mexican Freetail Bat *Tadarida brasiliensis*, are known to migrate thousands of kilometres, to overwinter in Mexico, escaping from the cold winter weather in the USA (Wilkins 1989). So if this species, which is smaller than *T. australis*, is capable of moving these distances, the Australian species should also be physically capable. But does it?

To investigate the patterns of distribution and/or activity, what I would like to suggest is that for a 12 month period as many people as are interested, keep records on a nightly basis, of when they hear the audible echolocation call of *T. australis*. It will be important for there to be records from all parts of the range of the species, not just in the south, so that we can determine if there are patterns of movements, and patterns of activity levels in areas where they are believed to occur throughout the year. Would people be interested in participating? It will be a simple project to be involved in - just record on a nightly basis, from the one general location, when they are heard, and equally as importantly, when they are not. For those people that have lost the upper end of their hearing range and can no longer hear the audible call, I am sorry, you are missing out on one of the simple joys of life! - maybe you can enlist the help of others in your recording.

Suggesting a project such as this will bring up the age old question of how many species make an audible echolocation call. Most species make social calls which are within our hearing range, so there needs to be a distinction between the clear, regular, pulsing echolocation calls and the more bird-like social calls. As for the echolocation calls, the Yellow-bellied Sheath-tail Bat, *Saccolaimus flaviventris*, produces a call with a characteristic frequency of about 18 kHz, compared to *T. australis* at 11 kHz (Herr and Klomp 1997), and so this species needs to be considered, especially in areas where they regularly occur. When analysing Anabat calls of other species such as Little Freetail Bats *Mormopterus*

spp. and Gould's Wattleed Bats *Chalinolobus gouldii*, the fundamental characteristic frequency is above 25 kHz, which is outside the hearing range of the vast majority of people. Therefore, in theory, we should not be able to hear the echolocation call of these species. However, I know a number of people that swear they can hear them. So either they have extremely good hearing (which is possible) or at times the bats are using a different component of their call repertoire (possibly a lower harmonic) which is down within our hearing range. In this case the slow pulse rate of *T. australis* should help to distinguish it.

So if people would like to participate in this project would you please contact me. I am willing to coordinate and compile the records, and provide regular updates to everyone. It would be great to have a broad coverage, and lots of observers so we can really look at patterns throughout their distribution, and to have an ABS project in which everyone within the range of this species can participate. I can't guarantee that we can conclusively answer the migration question, but at least we might be able to elucidate some trends or patterns. Please contact me via email <L.Lumsden@nre.vic.gov.au> or mail (see above), or phone on 03 9450 8694, and I will send further details and keep a record of who is participating.

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## **The Phoenix Bat Wailer - trials and tribulations in the first five months**

*Greg Richards*

*PO Box 3305, Belconnen, ACT 2617*

The Phoenix Wailer has an extremely successful track record throughout the world to deter pests from crops, airports, and livestock. It is now used in 16 countries to deter a variety of pests and the standard system has now been modified to emit the types of sounds that disturb flying-foxes. The results to date have been very encouraging, and this article outlines current progress with testing, both by the developer and fruitgrowers who have purchased this equipment.

### **How does it work?**

The Phoenix Bat Wailer is an application of 'surround sound' technology, also used in state-of-the-art home theatre systems, but this is on a three hectare scale. A four-channel master control unit is located in the centre of an orchard, and speakers are positioned at each corner of the crop. It is effectively four stereo systems controlled by a micro-computer which randomly selects which channel to use. Target animals consequently cannot predict the section of the orchard where the next sound will be emitted, which is why habituation does not occur.

Bursts of sounds are played according to a program that has been designed for each particular pest situation. Over 90 different electronic sounds can be generated, and there is also a suite of special 'natural' sounds (shotgun blasts, distress calls, etc, etc) that have a proven effect on flying-foxes. The separation of the speakers at about 150 metres causes a reverberation effect, which probably causes temporary headaches in animals when they are between the speakers.

The system automatically switches from day to night programs so that bird pests can also be excluded. The system has a very successful track record against birds, which is why I decided to modify it for bats.

### **Feedback from orchardists**

In an article in the 7 January 1999 issue of "The Land", a stonefruit grower near Kempsey independently reported to the journalist that he paid for his Bat Wailer within a fortnight. He estimated that he "would have lost half his potential yields and at least half his annual income had he not used the Wailer". This grower estimated that it was 90% successful, so the 10% loss was an acceptable level, and meant that at least a few bats were fed! More importantly though, his shotgun stayed in the cupboard whilst his crop was protected.

### **Trial results**

I have conducted several trials with the Bat Wailer. The first test was at Lismore last October in an early ripening crop of peaches and nectarines. The orchard contained nearly 900 trees, covering approximately 1 hectare, and had adjacent rows of eucalypts that were used by bats as feeding roosts.

The trial was conducted over 5 nights, and worked superbly from the first night. The grower had observed 20-30 bats per night from the onset of ripe fruit, but after operation of the Bat Wailer only a few could only be found in gum trees at the boundary, and none in the orchard. For the next three nights of the trial, no bats were seen within the orchard, but a few fruit were taken at one edge, which is where losses always seem to occur. Overall, less than 20 individual fruits were taken over the trial period, and I calculated that the loss in this orchard was less than 1%. An adjacent orchard was heavily raided during this short trial.

A second trial was conducted again in stonefruit, but this time at Gatton where a major influx of Little Red Flying-foxes from western areas was causing huge chaos. Because the animals were starving (70% of normal weight), this was about ten times the pressure seen at Lismore, so the Bat Wailer really had its work cut out this time. The system was still effective, but these bats (which seem to be able to take flight from a lower point than the larger species) managed to avoid the reverberation effect by only feeding in the very lowest branches. Countering this type of problem is the “fine tuning” that is part of the continual research, and I feel that this situation could have been corrected with adjustment to the speaker placement. However, the losses in the Gatton orchard were estimated to be only the order of 10 - 20%, so it was still an economically viable control method.

A third trial was conducted in a lychee orchard near Cairns, this time with some financial support as my wallet was draining rapidly. The Department of Environment had chosen several orchards where they had measured fruit drop (seeds and ejecta) under a sample of trees prior to the trial. I selected an orchard which turned out to be the orchard from hell! With only three nights to prove the system, I had my work cut out with trees that were over 6 metres high and 5 metres wide, and touching in the rows. This made a massive sound barrier, and it wasn't until I got all four speakers and the central control unit elevated to treetop level to produce the reverberation effect, that I got a result.

The data from this trial didn't look good, as the Bat Wailer was only effective for one night. It was therefore not possible to differentiate between samples under the trees in the protected versus unprotected halves of the orchard. There was no sampling under eucalypt trees at the orchard boundaries where bats carried fruit, so the sampling technique was flawed to some extent. Unfortunately, DEH decided to take more note of this sampling than my counts of bat numbers, which had dropped dramatically when sound reverberation was produced, so the trial received negative publicity in the deep north. C'est la vie!

Current trials include two lychee orchards in northern NSW using grower feedback. At the time of writing a third trial has just been set up in that area, and monitored by an independent horticultural consultant so that the results have better credence than my personal data. In the middle of this year another trial will be established in the southeast part of Thailand, and with a new suite of bat pests this will be quite a challenge.

### **The extent of the problem in orchards**

One of the most interesting aspects of my last five months has been dealing with the orchard industry at a different level. Growers are understandably reticent to talk to scientists and conservationists, but reveal a lot more when talking with someone who has the potential to help them with their problems. I hadn't quite realised the impact of flying-foxes on individual growers, let alone throughout the whole

industry, and it is far more significant than we realise. Losses seem to average around \$20-30,000 per year for family-run orchards, and up to \$100,000 for large scale commercial growers.

Worse though, is the real numbers of flying-foxes that are shot each year in orchards. Figures of 30 killed per orchard per night are commonplace, which equates to 1200 animals per orchard per year. Extrapolate this over a region with a lot of orchards and the figures are horrifying, and it is no wonder that we have several species declining in numbers. This impact would seem to be far greater than the slower decline due to habitat loss, but when combined both threats are highly significant.

### **The Wailer in camp disturbance**

One of the uses of the Bat Wailer that I do not promote, in fact discourage, is for shifting colonies. For various reasons, it was legally impossible to not provide a Wailer for use in the Maclean issue, but at least the application was to shift the animals to create a buffer zone.

As many people are aware, the Maclean issue received incredible national publicity on both television and radio networks, and every second word used was “Lyssavirus”. This seems to have now created a panic of sorts throughout the community, and there are very few people who have flying-foxes near them who now do not know about this disease. Irresponsible journalists reported that school children at Maclean were fearful of being bitten or scratched, and the impression was given that bats actually home in on humans when they (the bats) are afflicted with this disease. This negative publicity about flying-foxes has made my phone run hot with enquires from people who want a Bat Wailer to shift a colony near them, and this includes private citizens as well as local authorities.

Having had to deal with this new use for the Bat Wailer, but to ensure that it is not used for total camp removal, emphasises to me that with issues like Maclean, sometimes our best strategy as conservationists is to compromise a little so that the negative publicity about bats is reduced, and the problem is then nipped in the bud as soon as possible.

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## Australian bat lyssavirus and equine morbillivirus update

Hume Field

Animal Research Institute, Queensland Department of Primary Industries

Identification of risk factors for lyssavirus disease in flying-foxes is currently receiving the attention of our group. Analysis of the large body of data gathered over the last few years is now underway with the aim of identifying any associations between a range of variables and disease status, both at an individual and at a population level. For example, preliminary analysis has suggested that rescued (sick and injured) bats are far more likely to have lyssavirus infection than are wild-caught bats. 'Species' appears to be an important risk factor also, with *P. scapulatus* (Little Red Flying-fox) demonstrating significantly higher disease prevalence than other species. Other variables such as age, sex, region and time of sampling are also under consideration.

Colleagues at the Elizabeth Macarthur Agricultural Institute in NSW recently identified lyssavirus infection in a second microbat species. Two long-eared bats *Nyctophilus* sp. tested positive for virus antigen by fluorescent antibody test (FAT) last month. Both were found (dead) in occupied houses, one on the south-western outskirts of Sydney and the other near Goulburn. Previously, *Saccolaimus flaviventris* (Yellow-bellied Sheath-tail-bat) was the only member of the Microchiroptera in which lyssavirus had been found. In Queensland, *Nyctophilus* sp. had not been targeted for active surveillance by our group, so we have little data on this genus. Of nine individuals submitted ad-hoc and tested by us previously, none were positive.

A second human case of lyssavirus disease occurred recently in central Queensland. A Mackay woman died after an apparent prolonged exposure, the only history of direct contact with bats having been over two years earlier when she was bitten by a flying-fox. It is reported that the flying-fox 'landed' on a child at a BBQ, and the woman was bitten when she attempted to remove the bat. This incident occurred some months prior to the previously reported fatal human case. Post-exposure treatment was not received. Polymerase chain reaction (PCR) tests have shown the genetic 'fingerprint' of the virus to be consistent with the 'pteropid' genotype. This tragic episode further illustrates the need to not only avoid bat bites and scratches, but in the event of such contact, to seek prompt medical treatment.

A new case of equine morbillivirus (also known as Hendra virus) has been diagnosed in a mare that died near Cairns recently. The mare died on the 18th January after a short illness. Given the relative isolation of the mare, the QDPI does not anticipate any subsequent spread of the virus from this case. This case represents the third known occurrence of 'spill-over' of the virus into horses. Previous incidents were in Mackay in August 1994 and in Brisbane in September 1994. Flying-foxes are believed to be the natural host of the virus.

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## **Wildlife Caring and Conservation**

### **The impact of drought on the flying-foxes of the NSW North Coast**

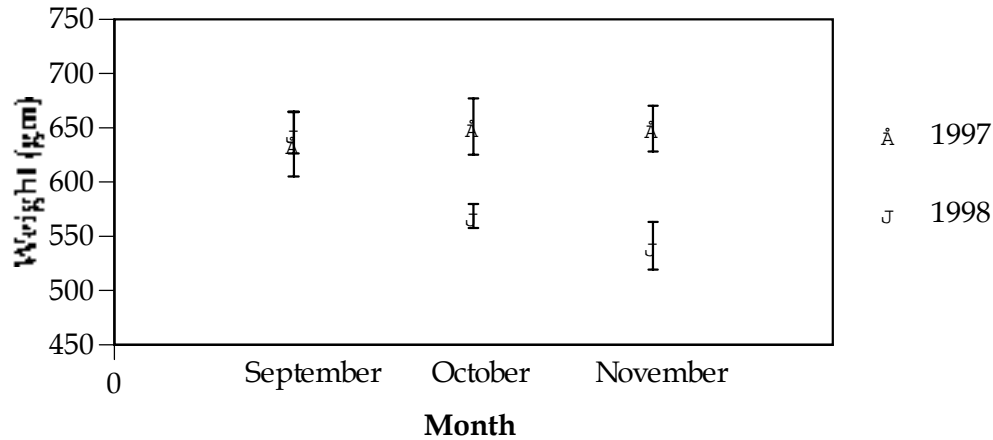
*Linda Collins - Flying-fox Information and Conservation Network*  
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October 1998 illustrated the value of data collected by wildlife carers who have no scientific training but who recognise the role they play in the conservation of a species under threat. For ten years member groups of the Flying-fox Information and Conservation Network have been recording the precise number of animals collected by their individual groups and providing this data to a central data base. During the months of October and November 1998, a food shortage crisis was experienced by the flying-foxes of the NSW North Coast from Taree to Lismore. The value of the data collected by these groups in assessing the impact of this situation on the population of Grey-headed Flying-foxes illustrates the dual role of the wildlife carer.

Northern Rivers Wildlife Carers travelled a total of 6000 kilometres during this time rescuing starving animals entangled in backyard netting and barbed-wire fences. Reports of dead animals hanging in backyard trees became so numerous (up to five animals at a time in one tree) that wildlife care groups could only record the location and number of bats and did not have the resources to collect the bodies. Colonies became deserted and animals dispersed along the entire north coast, roosting in small numbers as low as four animals in backyards or any small patch of trees near a food source. This food source generally consisted of unripe backyard fruit. Reports of animals flying during the late afternoon were common. Large numbers of Grey-headed Flying-foxes were reported inland around Inverell and Glen Innes. Fatalities of orphaned young collected by FICN is usually 5% or less - by late November 1998 this figure had reached 72%.

The greatest problem in dealing with this crisis was a lack of vaccinated carers to cope with the volume of animals requiring assistance. All expenses incurred were being absorbed by only a handful of carers, yet these expenses are often considered by some members of the scientific community as non-productive and better spent on conservation. The data below illustrate the tasks faced by carers in rescuing orphaned flying-foxes and in reducing the stress on communities having to witness the prolonged and agonising death of animals entangled in barbed-wire or backyard netting. While caring members of the public will remove these animals themselves if the local community based wildlife rescue service does not respond, incidents of being bitten or scratched due to inexperience with handling bats fuel the media's persecution of flying-foxes in relation to Lyssavirus.

It is curious that, while failure to assist a dying or injured domestic animal is considered an act of cruelty, the same assistance afforded a native animal is considered a waste of resources and a lack of concern for conservation. Wildlife caring is a service provided by volunteers for the benefit of their local communities, and, when managed correctly, is also a valuable conservation tool. Rescue, care and conservation are all required by our native fauna and are not mutually exclusive.



**Figure 1.** The mean weights ( $\pm$  standard error) of postpartum female Grey-headed Flying-fox collected by three wildlife care groups in north east NSW from September to November in 1997 and 1998. (Data provided by FAWNA, WIRES Clarence Valley and NRWC; compiled by Linda Collins, Flying-fox Information Conservation Network.)

Figure 1. shows the consistency of weights throughout spring of 1997 (n=14) and during September 1998 when no food scarcity was documented. It also shows the decrease in weights which occurred after the period of food scarcity commenced in early October 1998 (1998: n=48).

	1998	1997
<b>Total animals handled</b>	<b>184</b>	<b>30</b>
<b><i>P. poliocephalus</i></b>	<b>170</b>	<b>26</b>
current season's young	93 (55%)	11 (42%)
adult females	42 (25%)	7 (27%)
adult males	14 (8%)	3 (11%)
subadults (1yr old)	21 (13%)	5 (19%)
<b>Total (as of 28/11/98)</b>	<b>379</b>	<b>94</b>

**Figure 2.** Counts of flying-foxes handled by three wildlife care groups in north-east NSW from 1/10/98 -25/10/98, with comparisons from the same time period in 1997.

In 1998, over 80% of animals handled during October and November were either dead when collected or died within 24 hours (35% in 1997). Approximately 65% of young collected by wildlife carers in 1998 were premature births (2% in 1997), classified on the basis of 1) poor ear formation including “ears flat to head”, 2) eyes not opened, 3) patterns of furring. The relative proportions of animals in different demographic groups did not vary significantly between years. (Data are based on animals actually handled by the wildlife care groups. They do not include reports of dead animals, which were not retrieved, e.g. animals in inaccessible locations.)



## Book Review: Australian Bats by Sue Churchill

Catherine Caddle

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As I sat down to review this book, the first sentence made me put it down:

“Bats live their lives in a dimension so different from ours that we cannot escape a sense of wonder at the precision of even the simplest aspect of their biology.”

I sat for a moment and thought “Yeah – all right!” It struck a chord. Sue Churchill had just described exactly what it was that had made me choose to study bats above any other faunal group. I instantly picked the book up again and wanted to read more and it certainly didn't disappoint. It is an excellent field guide.

I think I appreciated most the fact that Sue Churchill has not spared us her enthusiasm for bats when writing this book but given a very candid account of her life as a researcher and her encounters with bats. She has included some funny and interesting accounts of trials and tribulations in the field which others will undoubtedly relate to. I particularly liked her accounts of surveying for Ghost Bats in Beliefs about Bats (p. 21) and the rediscovery of the Golden-tipped Bat (p. 165).

The book is divided into three sections; a general introduction, species identification keys and a section of species accounts. The first section of her field guide is a wonderful description of bats covering general life history, biology, methods for studying bats and associated risks. It is written in a very simple and entertaining style, which will be inviting to a wide audience. Even if you are well acquainted with the information contained in this section it is presented in such an original, unclipped way that it will be well worth a re-visit.

The second section covers the keys, which are probably the hardest part of any field guide to get perfectly correct, especially when covering all Australian species. I must admit I haven't road tested it yet but it appears to be clear and well set out. The use of drawings will help everyone in recognising the appropriate characters, but this will be especially useful for the inexperienced person. The lack of taxonomic resolution of many Australian bats makes it very difficult to work out what forms to include in a publication such as this and I think Sue has dealt with this very well. She has predominantly used the recognised forms where the taxonomy is yet to be fully resolved and has included a key for difficult genus *Mormopterus*. Interesting to note, Sue has not accepted the recent revision of *Myotis adversus* into a species complex, prefers *Phoniscus* rather than *Kerivoula* but has accepted *Nyctinomus* over *Tadarida*. *Vespadelus finlaysoni* has been incorrectly spelt *findlaysoni*.

The third section covers all Australian species, even those occurring on offshore islands which have been ignored in other publications. This section of the book is a real credit to Sue as she has amalgamated contributions from the varied and colourful facets of Australian bat research, (including unpublished data) to produce species descriptions full of new and interesting insights. In addition to identification information the species accounts cover roost habits, diet, foraging and reproduction, with references used provided at the end of each account. A range of measurements has also been included

for each species with regional variation shown where appropriate and there are some great photos of each species.

The publication of a book like this is a really positive PR exercise as it helps make bats accessible to more people. It is perfect to recommend to field volunteers or keen amateurs who express interest in bats and a desire to know more about them. I am sure that for this audience it will not fail to enchant and foster that interest. It will also be invaluable for bat biologists by providing technical information and identification keys.

It is a great book, affordable, compact, enjoyable to read and very useful in the field. Everyone interested in Australian bats should have one!

**Australian Bats by Sue Churchill is published by Reed New Holland (1998) and retails for \$29.95.**

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## **Flying-foxes at MACLEAN: An Overview**

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A small patch of rainforest in the town of Maclean has been used by flying-foxes as a roosting site for over 100 years. Grey-headed Flying-foxes have used the roost throughout this time. Little Red Flying-foxes occasionally visit the site. Their presence is usually associated with the flowering of Melaleuca in the surrounding area. In the past four years there has also been a constant presence of Black Flying-foxes. The site is a maternity roost for both Grey-headed and Black Flying-foxes, and the numbers of bats in the roost fluctuates according to food availability.

On various occasions over the last 100 years the citizens of Maclean have attempted to remove bats from the site, particularly when numbers are high. The Maclean Historical Society has evidence of the use of such deterrents as explosives, guns, smoke, etc, etc. These records indicate that highly destructive measures used over extended periods and in which many animals are killed, were only sometimes successful in removing the bats, and then only for short periods. No method has been successful in permanently relocating the roost. In addition, **the disturbance of animals in established roosts has not been permitted in NSW for over ten years.**

## **Present situation**

Early in 1997, the Department of School Education began construction on an extension to Maclean High School, which brought the school buildings to within approximately 10 meters of the rainforest reserve and the flying-foxes. Plans for this extension had been drawn up by the Department and approved by the local Council without public consultation.

At the beginning of June 1998, 20,000 flying-foxes returned to Maclean and their numbers increased over the following days up to 45,000. The school held its Athletics Carnival on June 4. Despite an undertaking made by the school to limit disruption to the colony during the carnival, the starting pistol was fired 78 times during the course of the carnival. The terrified animals took fright, and when they settled, chose areas away from the school oval to do so. These areas included the school's western car park, the local showground and the trees in the cemetery area, which are the only other trees in the area. Transient animals such as these bats are restless in novel surroundings and easily disturbed. Each weekday morning, the school's PA system sent the animals circling over the area.

The school to this day has refused to recognise the part it played in this disturbance. Instead, it blames the flying-foxes and continues to permit other schools to use the oval without restricting the use of starting pistols.

The school's students staged an anti-flying-fox protest march on June 15. Anger towards the flying-foxes was running high in the P&C, and the staff held meetings to discuss the health and safety of the teachers and pupils working in the new buildings. The local member was inundated with complaints, which in the light of a swinging seat and an upcoming election made the idea of some action look very attractive.

By June 18, the flying-foxes had returned to the Reserve area from nearby trees and some of the transients had begun to leave. In the week following June 18, the numbers of flying-foxes continued to drop naturally as the animals moved on to other food sources. Maclean is an important transit stop during the regular movements of Grey-headed Flying-foxes up and down the East Coast which occur in response to the flowering of eucalypts. By July 6, bat numbers were down to a resident group of 8,000 animals. This three-week rise and fall appears to be the typical transient time-frame according to records kept over the past three years.

On June 18, 1998, the Minister for the Environment announced that if school officers were to apply for a licence to disturb to reduce the numbers of bats roosting in the Reserve it would be granted. In order to satisfy legal requirements for disturbing a threatened species, (the Black Flying-fox is a Schedule 2 vulnerable species under the NSW Threatened Species Conservation Act, 1995) the project had to be termed a scientific experiment. Dr Chris Tidemann, had offered his services as a consultant to the Department of Education and Training (DET) and was approached to draw up and present to NPWS Animal Ethics Committee a proposal which would scientifically disturb the flying-foxes at Maclean. This proposal failed to satisfy the 'scientific rigour' of the NPWS Animal Ethics Committee.

On October 28, 1998, a licence was issued to Ron Phillips on behalf of the DET by the National Parks and Wildlife Service (NPWS) to reduce the number of animals occupying the Maclean Rainforest Reserve by disturbance. One of the conditions of the licence was that numbers over 15,000 animals

must be reached before disturbance can be activated. During October and early November, only 2000 to 5000 animals occupied the colony.

December 1998 saw the number of animals returning to the reserve rise and fluctuate between 10,000 and 20,000. School children were now on holidays and the Minister for the Environment, Pam Allen, announced on the John Laws program on Dec. 16 that a disturbance/relocation would begin immediately. This was to proceed despite the fact that it was the middle of the breeding season and the colony contained approximately 1500 non-flying young. At this stage the disturbance had become a 'relocation' and not just a 'reduction in numbers'.

On January 6, RSPCA inspectors labelled the disturbance of non-flying young at the Maclean Colony an act of cruelty. On January 18, the RSPCA took both the Departments of Environment and of Education and Training to court over their proposed disturbance of the Maclean colony. While occupied by non-flying young, the proposed action was in breach of the Prevention of Cruelty to Animals Act. A compromise was reached: instead of a full disturbance to the entire colony only a 10 meter buffer zone between the colony and school would be targeted. However, as the demographics of the colony were unknown to the RSPCA, the compromise would not alter the effects of the disturbance to the non-flying young. Along with all Black Flying-foxes (a listed threatened species) and the majority of the resident population of Grey-headed Flying-foxes, most young were within this 10 meter buffer zone

While the RSPCA court case was in session on January 18, a new licence was issued to the DET by NPWS. To expedite this as quickly as possible, and to overcome any complications from Ethics, the licence was issued under the second criteria according to which a disturbance by harm can be carried out on a threatened species without an FIS "if the threatened species is considered a threat to life or property". Premature media releases by government departments regarding viruses, media hype and articles like those appearing in *New Scientist* were sealing the fate of these animals. The licence no longer stated an upper limit in the number of animals present in the colony before a disturbance/relocation could be attempted and a protocol was included. Point 6 of the protocol reads: "It is expected that non-flying young of protected species will require euthanasia". Death by starvation or lethal injection.

On January 20, 1999, the North Coast Environment Council through the Environmental Defenders Office (EDO) applied to the NSW Land & Environment Court for an urgent injunction to restrain the NPWS and DET from any action to remove the flying-foxes on the grounds that the matters set out in S91 (2) of the Threatened Species Conservation Act (TSC Act) must be established objectively. The granting of the licence would depend upon the existence of certain facts. The NPWS had insufficient evidence to establish those facts. On January 21, an injunction was granted by the court. In granting the injunction, the court acknowledged that there are substantive issues to be tried. The case will be presented to the court on the 17/03/99.

On February 11, the Maclean Rainforest Trust, a volunteer community group responsible for the administration of the Maclean Rainforest Reserve, was stood down by the Minister for Land and Water and an administrator was appointed.

The movements of Grey-headed Flying-foxes along the East Coast would be seriously curtailed by the loss of this site, and lack of access to the available food in this area. The numbers of these animals are declining rapidly as they lose feeding and roosting habitat throughout their range. Issues regarding the effects that the decline in numbers is already having in terms of regeneration of native forests, both eucalypt and remnant rainforest, as well as the effects of diminishing timber on water and air quality need to be given the highest priority .

Education, not eradication, is required. If we are to retain viable populations of flying-foxes they must be valued in their role as pollinators and seed dispersers and permitted to remain within the Reserve, with adjustments made to the school to allow for periods of changing numbers. These adjustments would need to include air conditioning, plans for expansion elsewhere to relieve the current pressure on the school, covered assembly, eating and walking areas, and a planned, responsive regime of noise reduction during the use of the school oval and PA systems. Nearby areas need to be set aside for extending the remnant rainforest, with the use of existing seedstock.

It is extremely important that we keep the situation of Maclean in perspective. At the 1996 Symposium, which was attended by many bat specialists, conservationists and representatives from the Health Department, it was agreed that the flying-fox posed little risk to the health of students and staff of the Maclean High School and that relocation of the flying-foxes was not a viable proposition. If the health situation has not changed for the students and staff (and it has not) - do politics and pressure now make relocation viable? If we as a society become fragmented by politics, then the protection of both the animals and their habitat is doomed.

Compiled by Linda Collins, Flying-fox Information and Conservation Network

Extracts used from "Maclean and the Flying-foxes, Crossroads or End of the Road" by Carole West.

If you would like to support this action, money is urgently required to cover court costs.

- Please make cheques/money orders payable to: North Coast Environment Council and specify that this money be used for the flying-fox fund.
- All donations are tax deductible and receipts will be issued.
- Pledges of money can also be made. You can pledge for example to donate \$100 to be paid at \$10 per month over 10 months.

➤

PLEASE SEND ALL MONEY AND PLEDGES TO:

NORTH COAST ENVIRONMENT COUNCIL  
P.O Box 91  
MACLEAN 2463

Ph/Fax: 02-6645 2168

## ***Contacts/NetWork/News***

### **Australian Bats - Colouring Book by Jill Morris & Lynne Muir**

If you are wondering what to buy your battophilic juniors for their next birthday/Christmas or just to keep them busy, this lovely little book may be just what you are after. The Australian Bats - Colouring Book is an early introduction to the world of our native bats and their unique shapes and habitats. Small rhymes and specific colouring instructions by Jill Morris accompany appealing drawings by Lynne Muir and provide basic information on seven species of fruit-eating and insectivorous bat. Wonderful as early education material, this book may also be useful for school projects and can even entertain more mature bat lovers with an inclination to doodle and colour. Why not send it to some batto friends overseas?

With the relative dirth of freely available early education material on bats, this booklet is a lovely addition to the collection. Look for it in the children's section of your local bookshop where it retails for a modest \$3.00.

N.M.





## **AUSTRALASIAN BAT SOCIETY CONFERENCE, 2000**

**TUE 25TH APRIL – FRI 28TH APRIL 2000**

### ***Where?***

Tocal Agricultural College, Paterson, The Hunter Valley, NSW.

The Hunter Valley is famous for its unique blend of scenery, historical towns and award winning wineries. It is a major tourist destination with tourists tasting wine at more than 70 regional wineries and in their more sober moments succumbing to the excitement of sky diving, hot air ballooning and whale watching (to name just a few activities). Just the place for our conference! Actually the Hunter is a rich area for bats. Ratcliffe (1931) identified 9 flying-fox colony sites in the Hunter and certainly we know of a similar number in existence today.... probably the same sites! And there is a considerable microbat fauna with some spectacular colonies of some species in the area.

### ***Travel***

Road: Paterson is located a couple of hours north of Sydney by road. Road maps to Tocal will be issued on request.

Train: The closest train station is Maitland and from here delegates will be met by shuttle bus and transported to Tocal. It is anticipated that the shuttle bus will also meet some train services at the Newcastle stations.

Air: We will meet arrivals at the Newcastle Airport (Williamtown). This is serviced by Eastern Australia Airlines and Impulse Airlines among other carriers and there are incoming flights from Brisbane, Coolangatta, Lismore, Coffs Harbour, Port Macquarie, Tamworth, Sydney, Wollongong, Canberra, Cooma, and Melbourne.

### ***Accommodation***

Tocal College provides accommodation for conference delegates from \$25 per night (and this includes free use of all facilities such as tennis courts etc). We are hoping that most delegates will be able to be housed on site, however we have started booking extra accommodation the local caravan parks and motels close to the venue.

***Social Events***

There will be social activities on each of the evenings of the ABC 2000, including Fri 28th April. All activities will be held on site at Tocal with the exception of the Conference Dinner. This will occur at a local Winery. More details later! Trips to local mega and micro bat colony sites will be available to delegates during the Conference.

***Post-conference field trips***

A post-conference field trip is planned for the week-end 29th/30th April. This will involve microbat survey work.

***Cost***

The Organising Committee is committed to keeping the cost of registration as low as possible. Full-time students will be eligible for discounted registration, as usual.

***Expressions of Interest***

Further details will appear in upcoming editions of ABS Newsletter. However, if you are interested in going to the Conference, please contact us and register an “expression of interest”. This does not cost anything, nor does it oblige you to attend. It does, however, give us a rough estimation of the number of people who may be coming. Also it will put you on a mailing list so that further information on the Conference as well as your registration papers can be mailed to you.

***Organisation***

We are looking for volunteers to help with the Conference. If you would like to join the Organising Committee please contact us.

email: <wambina@ozemail.com.au> , fax 02 43 653232 or mail RMB 30 Wambina Rd Matcham 2250 NSW, Australia.

**Kerryn Parry-Jones**

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## **Flying-fox Consultative Committee to advise on protection of fruit crops**

Following a season of poor native flowering and high fruit-crop losses to flying-foxes, Queensland's Department of Primary Industries (DPI) in conjunction with the Queensland Fruit and Vegetable Growers Association (QFVG) have initiated the formation of a consultative committee to address the protection of fruit crops in this state. While still in its formative stages, the committee presently consists of representatives from the former two departments as well as from the newly reincarnated Queensland Parks and Wildlife Service (QPWS - formerly Department of Environment and Heritage) and bat scientists from the University of Queensland. The latter two groups simultaneously provide representation from the Australasian Bat Society in the form of Bruce Thompson, Les Hall, Patrina Birt and myself. Representation from the Australian Conservation Council (ACC) is also being sought.

The aim of the committee is to assess crop protection strategies (ie. bat dispersal and exclusion methods, planting of alternative food sources), their effectiveness in the short and long-term and suitability to specific requirements. It will also seek to develop models for predicting seasons of low native food resources and thus the potential for high fruit damage by flying-foxes. To achieve its goals, the committee plans to raise funds for research and intends to serve as a vehicle for communication between fruit growers, researchers and government on the progress of this research. Initial meetings have established a positive basis of communication between all representatives who will meet regularly prior to the next harvesting season to discuss progress. An information sheet produced by this committee is enclosed with this newsletter.

N.M.

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## **BATALOGUE ON WWW !!**

Some of you may remember the "Batalogue" that was displayed as a poster at the 1996 Bat conference in Naracoorte. This useful compilation of references on the taxonomy and ecology of bat species occurring in NSW can now be found on the NSW National Parks and Wildlife internet site at :

**<http://www.npws.nsw.gov.au/science/bsp/batalog/index.html>**

Many of these references were donated by members of the ABS, to whom I am very grateful. Preliminary discussions on the maintenance and updating of this reference material have begun, any suggestions welcome !

**Marg Turton**

## **12<sup>th</sup> IBRC - Malaysia 2001**

Word has just reached our ears that the planning of the next International Bat Research Conference (IBRC) is now in full swing for early in the new millenium. It will be held on

**5-9 August 2001**

in

**Bangi, Malaysia**

This, as you may have noticed, is a mighty convenient location for Aussie and Kiwi battoes and a great opportunity to catch up with our international friends and colleagues. Not to mention a perfect excuse to explore the exotic tropical shores of our northern neighbours!

Enquires about conference details can be directed to:

Dr. Zubaid Akbar  
Dept. of Zoology  
Universiteiti Kebangsaan Malaysia  
43600 UKM Bangi  
**MALAYSIA**

email: [zubaid@ukm.my](mailto:zubaid@ukm.my) or [zubaid@pop.jaring.my](mailto:zubaid@pop.jaring.my)

[www.fsh.ukm.my/fsh/dept/bz/zubaid.htm](http://www.fsh.ukm.my/fsh/dept/bz/zubaid.htm)

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**Australian Museum Bat Exhibition 1999-2000: An Up-date**

The Australian Museum's bat exhibition is developing at frightening speed. The planned opening has been delayed for three months (due to Museum time-tabling changes). The new dates are late September 1999 to early February 2000, which includes two school holiday periods. Unfortunately, the delayed start does not extend to deadlines which remain incredibly tight.

I am pleased to say that the exhibition will include a purpose-built enclosure for four or five grey-headed flying-foxes, and the Ku-ring-gai Bat Conservation Society Inc. has kindly agreed to exhibit and talk about their bats on weekends and school holidays.

As outlined before, the exhibition is being designed with kids under 12 in mind, so the exhibition is more experiential, theatrical and visually oriented than text-based (Batman and vampires included). However, we're trying to include as much basic biology as possible and a conservation theme. We can't tell kids everything about bats in the small space available, but hopefully they (and their parents) will leave knowing a lot more than when they went in.

Running concurrently with the exhibition there will be bat-centred educational activities. These latter activities should include cyberspace links to bat-related web sites, so please send me your details if you want to be included as a linked web site. Also, if you have information about bats, bat boxes, etc. that you want displayed (notice board) or distributed during the period of the exhibition please let me know ASAP. This should be a good opportunity for an ABS Membership drive.

Also running concurrently will be a lecture series about bats, and hopefully guided batty tours or other activities within the Sydney area. Planning for the latter is in its embryonic stages, so anyone who would be keen to be involved in this way please contact me. (We would be happy to advertise batty tours for other states too.)

The ABS executive has kindly offered to help with a range of striking images of Aussie bats (thank you Bruce!), and we are hoping to be permitted to use some of Merlin Tuttle's wonderful bat pics. If anyone else out there feels they can help in this regard, I would be delighted to hear from you. We have a hit-list of images required if anyone would like to see it.

Thanks to all ABS members for their help and enthusiasm for the exhibition.

**Sue Hand**, School of Biological Science, University of New South Wales, NSW 2052 Australia  
mailto: s.hand@unsw.edu.au      ph: 02 9344 8704 or 9385 2113      fax: 02 9314 0689

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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 fruitgrowers, everyone benefits from our unification. By presenting a united front to assist the resolution of conservation problems, or to lobby politicians, or simply spread the good word to the public, the goals of the ABS are conveyed more efficiently than through individual effort. 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 <L.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 .....

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