

BATS IN CAVES

- Elery Hamilton Smith

INTRODUCTION

Bats are an integral part of the natural environment. They undertake a range of important ecological functions including the control of insects and other invertebrates, the pollination of trees and the dispersal of rainforest seeds. A number of Australian bat species rely on caves for shelter during daylight hours as well as to raise young, mate and fulfil a range of other functions. For many of these species, caves provide the only habitats at which critical life functions necessary for their survival can occur.

This statement of recommended policy and principles in the conservation and management of cave-dwelling bats has been prepared to provide guidance to both land managers (both public and private) and those who visit caves.

THE PLACE OF CAVES IN THE LIFE OF BATS

Although some bats (see appendix) appear to use caves only occasionally or opportunistically, there are many species of bats which always or very often roost in caves (or substitute environments such as mines and water tunnels) throughout each day. It appears that this is generally related to the regulation and/or maintenance of required body temperatures at specific seasons of the year. Thus, the specific sites chosen often vary from season to season for each species, but often they are critical for survival.

Many of these species may also use mines, tunnels or other artificial structures as an alternative to caves. As special considerations apply to these, they will be dealt with in further papers.

The species using caves on a consistent basis are listed below.

Flying Foxes	
<i>Pteropus alecto</i>	Although generally tree-dwelling, in some areas this species will roost in the entrance zone of caves.
Genus <i>Dobsonia</i>	Commonly roosts in caves or mines, but within sight of daylight.
Horseshoe Bats	
Genus <i>Rhinolophus</i>	Gather in summer at specific maternity sites, sometimes shared with bent-winged bats, but throughout rest of year are widely dispersed in other caves or mines. In southern states, large numbers may roost in specific hibernation sites.
Genus <i>Hipposideros</i> and <i>Rhinonycteris aurantius</i>	Normally roost throughout year in caves or mines, various of which may be used as a maternity site.
Ghost Bat	
<i>Macroderma gigas</i>	Normally roosts throughout year in caves or mines, one of which in each region may be used as a maternity site.
Sheath-tailed Bats	
Genus <i>Taphozous</i>	Commonly roost in caves or mines, often in the twilight zone, but also found in forest roosts.

Vespertilionid Bats	
<i>Chalinolobus dwyeri</i>	Usually roosts in caves or mines
<i>Chalinolobus morio</i>	Generally a tree-dwelling bat in Eastern Australia, but in Western Australia and the Nullarbor Plain, it generally roosts in caves in very large populations. Like the bent-winged bats, it selects specific caves as maternity sites.
Bent-winged Bats Genus <i>Miniopterus</i>	This genus is widely distributed from Europe to the South Pacific. In Australia, it virtually always roosts in caves. Each population is based upon a single maternity site which appears to be chosen for the suitability to enable the bats to build up a high temperature (up to 36°C) in order to provide a suitable environment for the birth and survival of the young bats, which occurs in summer. Other caves (or mines) throughout the population range, which may extend for several hundred km. from the maternity site, are used throughout the rest of the year.
Genus <i>Myotis</i>	Often roost in caves, although their definition of a cave is commonly a small cleft or hollow only 10-15 cm. in diameter.
Genus <i>Vespadelus</i> <i>V. caurinus</i> (Kimberly, N.T.) <i>V. douglasorum</i> (Kimberley) <i>V. finlaysoni</i> (Central deserts)	Usually Roost in caves throughout the year

<i>V. troughtoni</i> (Qld & northern NSW dividing range)	
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ISSUES AND THREATS

Cave dwelling bats are particularly vulnerable because very large numbers may occur in one site; in some cases a maternity site may contain virtually all the female and juveniles of a bat population which when dispersed will spread over

an area of up to 1,000 square kilometres. They are also dependent upon the cave environment for management of their own body temperature and metabolism. At the same time, they also depend upon the availability of food in the surrounding countryside. There are a wide range of potential threats to their survival:

Habitat Destruction	By mining, quarrying, inundation, filling of entrance
Habitat modification	Tunnelling or obstruction Damage during road building Rock collapse Rubbish dumping Microclimate changes as a result of regional changes, e.g., in groundwater levels or as a result of clearing surface vegetation Use of badly designed cave gates Invasive plants (e.g., lantana, blackberries) blocking entrances Alterations to predator access Tourism infrastructure or fencing at entrance
Reduction of food supply	Changes in land use or land management practices, including increased use of insecticides, land clearance, mono-culture planting etc. Draining of wetlands Wildfire
Poisoning	Impacts of some insecticides or fungicides Drinking from poisoned waters, e.g., some mine tailing dams Use of internal combustion motors in or near caves with risk of CO poisoning. Other pollutants
Human Interference	Inappropriate visitor behaviour or major disturbance of maternity or over-wintering sites

Sites of special importance include:

- Where bats are in a torpid state during winter, particularly in Southern Australia, as disturbance may use up the energy reserves required for over-winter survival
- During the birth and nursery period in acclimatising and maternity sites

Every effort must be made to minimise disturbance of bats during the seasonal use of these sites.

Unusual weather conditions, when bats may not be able to feed normally, may be a significant problem and again cause run down of energy reserves

RECOMMENDED POLICIES AND PRACTICES

1. All bat species are protected by appropriate legislation, but there should be continuing programs of public education to ensure the people are (a) aware that bats are protected species and (b) understand the ecological value of bats and hence the reasons for protection.

2. All Environmental Impact Assessments should include consideration of impacts on the biodiversity (including bats and insects) of the area concerned. It must be recognised that the feeding territory is of central importance, not just the roost site.

3. Where any changes or construction are to be undertaken in the vicinity of a roost site, every

effort should be made to have an adequate Environmental Impact Assessment carried out (even informally) in order to minimise the impact upon the bat population.

4. All sites identified as being critical to the survival of bats should be given the most appropriate effective protected status. These sites certainly include maternity sites and caves or mines used for over-wintering by large numbers of bats. They may occur in existing parks or nature reserves, but if not, efforts should be made to ensure their inclusion under proper reservation. If on private land, the owner may well, and many do, ensure effective oversight and protection; may be willing to ensure a permanent covenant for protection purposes; or may agree to selling a site for inclusion in a park or other protected area.

5. Any changes, whether natural (e.g., rock collapse) or caused by human intervention (e.g., gates, viewing platforms, etc.) must be carefully reviewed to determine any damaging impacts upon bat populations and where possible, remedial action undertaken.

5. Where it is absolutely necessary, caves may be gated for protective purposes but this should be a strategy of last resort. If this is done, gates should be designed to provide continuing accessibility for the bat species which occur on the site, and after installation must be monitored to ensure that access has been maintained. All gates should be

accompanied by an information sign explaining the reason for the gate, the need to avoid undue disturbance of bats, and a contact for further information or access permission. Gates once installed should also be inspected regularly.

6. Every effort should be made to educate regular, occasional or potential cave visitors about the importance of bat protection. In any given region, this should give special attention to defining periods when and sites where disturbance is particularly undesirable.

For further information or species identification.

see Churchill, Sue, 1998. *Australian Bats*. Sydney: Reed New Holland.

APPENDIX 1:

Species only occasionally found in caves

Chaerophon jobensis *Chalinolobus picatus* *Chalinolobus tuberculatus* (N.Z.) *Mystacina tuberculatus* (N.Z.)
Nyctophilus geoffroyi