



Bats and Paddock Trees

Insights from recent research

Large old trees, scattered across paddocks in rural landscapes of southeastern Australia, are widely appreciated for their aesthetic appeal. Increasingly, they are also being recognised for their economic benefits, such as providing shade and shelter to livestock, lowering the risk of dryland salinity and reducing erosion. Fewer people are aware of their value in conserving biodiversity. One group of animals that commonly use paddock trees are insect-eating bats. These valuable native mammals often go unnoticed because they are small, largely silent (to our ears at least), hidden during the day in roosts, and only feed at night when they may be mistaken for a moth or late-flying bird.



Freetail Bats (*Mormopterus* sp.) eat large quantities of Rutherglen Bugs, a well known agricultural pest, taken from around trees and over crops.



The Little Forest Bat (*Vespadelus vulturinus*) is the smallest species in southeastern Australia weighing only 4g, less than the weight of a 10c piece. It could easily fit inside a matchbox!

Bats eat a wide range of invertebrates, predominantly moths, beetles and bugs, with some species also taking spiders, mosquitoes, grasshoppers and crickets. Individuals can consume up to half of their body weight in insects in a night. Some species have been recorded catching up to 600 mosquitoes in an hour. The role they play in reducing insects is likely to be particularly important around sparsely scattered trees, because there are few insect-eating birds in these situations.

Threats to paddock trees

Despite there being few trees left in farmland, they continue to be cleared, either intentionally, or at times unintentionally, such as during stubble burns. Dieback from factors such as insect damage and salinity can severely affect paddock trees, sometimes resulting in their death. Natural senescence (dying from old age) is also occurring because many trees are more than 200 years old, and there is little natural regeneration to replace them. Some estimates suggest that at current rates of clearing, dieback and senescence, large old paddock trees will completely disappear from many areas within 40 years.



A solitary tree remains, after surrounding trees are cleared and burnt.

Bats of northern Victoria

There are 13 species of insect-eating bats in northern Victoria plus one of the larger fruit bats - the Little Red Flying-fox (*Pteropus scapulatus*). Bats make up 45% of all mammal species in this area. They are widespread throughout farmland - any property with trees will have bats.



Above: Inland Broad-nosed Bat (*Scotorepens balstoni*)



Above: White-striped Freetail Bat (*Tadarida australis*)



Above: Chocolate Wattled Bat (*Chalinolobus morio*)

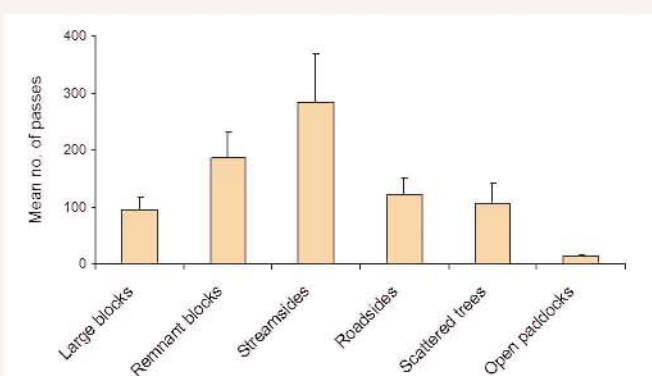
Right: Lesser Long-eared Bat (*Nyctophilus geoffroyi*)



Left: Eastern Freetail Bat (*Mormopterus* sp.)

Use of scattered paddock trees by bats

To investigate the diversity and abundance of bats in different types of remnant vegetation, 195 sites were surveyed across the Northern Plains of Victoria. Sites were located in large blocks of woodland (> 200 ha), smaller remnants (5-200 ha), streamside vegetation, roadsides and among scattered paddock trees. For comparison, sites were also located in open paddocks without trees. Bats were sampled using harp traps and ultrasonic bat detectors. Bats were detected at every site, and more than 1500 individuals of 13 species were trapped, their details recorded and then released.



Bat activity (the number of times a bat flew past an ultrasonic bat detector) in different types of remnant vegetation in the Northern Plains.

Bats were most commonly recorded in streamsides and small remnants. Surprisingly, activity around scattered trees in farmland was similar to that in large forest blocks. In contrast, the activity of bats in open paddocks was very low. Although a few species can forage for insects in open areas, most concentrate their foraging around trees, but can commute over open areas between different foraging sites. For these species, remnant vegetation in some form is necessary for their survival in the rural landscape.

Key finding: Bats make extensive use of scattered trees in paddocks.



Isolated trees in a paddock near Nathalia at which 29 individuals of 7 species of bats were caught in one night!

As tree density declines ...

To investigate the relationship between tree density and bat activity, bats were surveyed at 30 sites at Numurkah and Rutherglen in Victoria, and Savernake in NSW. Five categories of tree density were sampled:

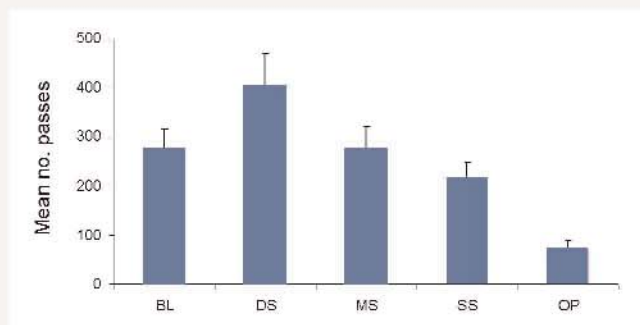
- BL = remnant forest blocks (> 35 trees/ha);
- DS = densely scattered trees (10-34 trees/ha);
- MS = moderately scattered trees (1-9 trees/ha);
- SS = sparsely scattered trees (< 1 tree/ha);
- OP = open paddocks without trees.

Bats were widespread, with activity levels similar across the four categories of sites with trees, but much lower in open paddocks. Every species in the area was recorded around sparsely scattered trees. This contrasts with other faunal groups, such as birds, of which many species prefer denser patches.

The highest level of activity was at sites with 20-30 large trees/ha; probably similar to densities of trees in this area before European settlement.

The average number of bats caught per site declined as tree density decreased, from an average of 48 bats in forest blocks to 40 in dense scattered, 29 in moderate scattered and 12 in sparse scattered trees.

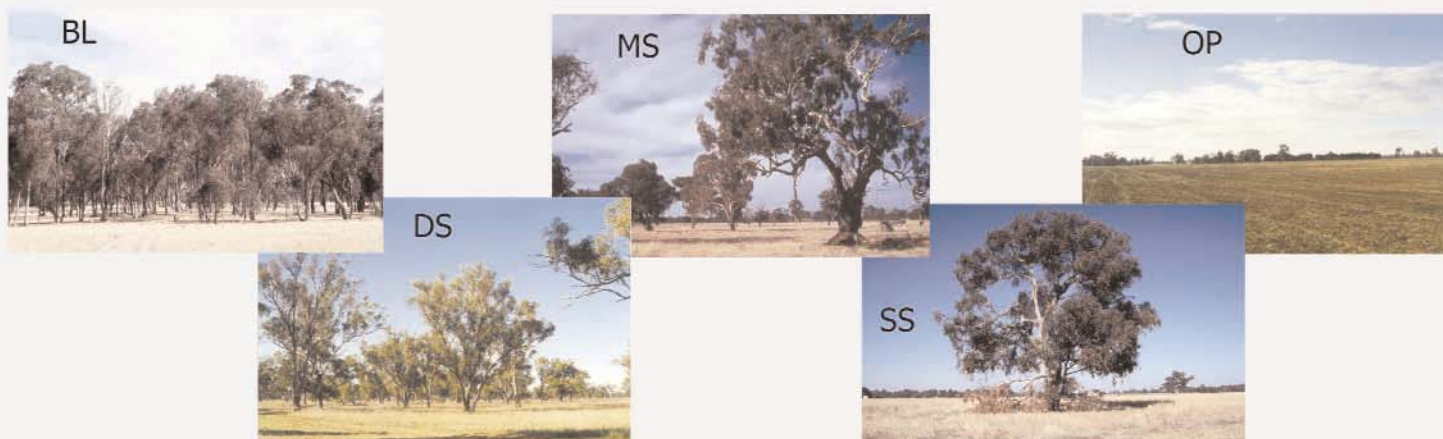
Bats are very mobile and may fly more than 10 km in a night. They are able to move between different patches of trees, including scattered paddock trees, to feed. This study shows that as the density of trees decreases, so too does the overall number of bats, but there is no lower limit at which trees are no longer used by bats.



Bat activity (the number of times a bat flew past a detector) in areas with different densities of trees.

Key findings:

- Every tree in farmland has value for bats.
- Bat populations are larger in areas with a higher density of trees.



Examples of the five different categories of tree density that were investigated for bat activity.

Roost trees

Scattered paddock trees provide another critical habitat resource for bats – roost sites. Of 147 roost sites found near Numurkah recently, 51 were in scattered paddock trees in farmland, the others being in remnant blocks and a small number in farm buildings.



Left: A large old Grey Box used as a roost site by Gould's Wattled Bats.



Right: Dead trees are valuable roost sites for many species of bats, in particular Lesser Long-eared Bats. Six individuals roosted in this tree.

What you can do to help

- Protect existing trees, e.g. prepare a firebreak before stubble burning, prevent inundation during flood irrigation.
- Consent may be needed before any trees are removed from private property - contact your local shire or DSE/DPI office to check before commencing any clearing. One tree may not seem to make much difference, but the incremental effect of many individual trees being lost is considerable.
- Protect dead trees too – these provide valuable places for bats to roost during the day.
- Reduce dieback and stress to trees by:
 - fencing and reinstating understorey plant species;
 - limiting fertilizer application close to trees;
 - increasing the buffer around trees when cultivating;
 - limiting excessive nutrient build-up under trees by reducing the number and frequency of stock camping there.
- Allow natural regeneration around trees by fencing or altering stocking rates, to ensure trees remain in the rural landscape in the long-term.



A tree that was not adequately protected during a stubble burn.



Natural regeneration ensures that when trees reach the end of their lives, others will replace them.

- Above all, appreciate these magnificent trees, some of which may have been here before European settlement. And leave them for the bats to appreciate too!



Gould's Wattled Bat (*Chalinolobus gouldii*)

Further Information

This information is based on 10 years research on bats in farmland areas of northern Victoria and southern NSW, by the Arthur Rylah Institute of the Dept. of Sustainability & Environment (formerly the Dept. of Natural Resources & Environment) and Deakin University.

For further information or extra copies of this sheet, please contact: Customer Service Centre ph. 136 186.

This sheet is also available at:
<http://www.nre.vic.gov.au/notes/>

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Other useful publications:

Anon (2001). 'Paddock trees: who'll miss them when they're gone?' Brochure produced by NSW National Parks & Wildlife Service, Dept. of Land & Water Conservation and Greening Australia.

Gibbons, P. and M. Boak (2002). The value of paddock trees for regional conservation in an agricultural landscape. *Ecological Management and Restoration* 3: 205-210.

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Lumsden, L.F. and A.F. Bennett (in prep.). The value of scattered trees in rural landscapes as foraging habitat for insectivorous bats in south-eastern Australia.

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Photo Credits:

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