Young District Landcare

MICROBATS

of the Young District

Major Players in Healthy Productive Landscapes and Waterways

INTRODUCTION

Welcome to the **'Microbats of the Young District'** Project – a three-year program co-ordinated by Young District Landcare to familiarise the human residents of the Young district with a group of tiny mammals seldom seen or heard, but of greater importance to our economy and environmental health than most people appreciate.

The Project has been made possible through funding by Riverina Local Land Services community grants.

In April 2014 the project was launched with a Bat Night presentation 'Microbats- Fascinating Creatures of the Night', followed by school and community group talks, newspaper articles and radio interviews. The fact sheet 'Wildlife in the Young District – Microbats' rounded out the initial education campaign.

Next came activities designed to enhance and protect microbat habitat "so that we can continue to reap the benefits of their presence into the future" (Mikla Lewis OAM- YDL Co-ordinator).

One hundred and forty microbat boxes have been manufactured and installed with information signs in various locations around the Young district. Volunteers have planted local 'bat friendly' native plants, with many also given away to encourage private plantings for future habitat.

At community workshops, primary producers have learnt about ecosystem services provided by microbats.

This booklet (designed to be read as a companion to the 2014 fact sheet), introduces the microbat species recorded in the Young district, their habitat preferences, and the ecosystem services they provide for us in residential and rural environments (broadacre, orchards, vineyards) and around waterways.

An Education Package incorporating this booklet, the fact sheet, a poster, PowerPoint Presentation and Microbat Project Manual completes the current project. It is anticipated that the Package will be presented to and used by local schools, community, and agricultural groups. It will also be available for use by other Landcare groups.

Young District Landcare has purchased AnaBat Detectors (which record echolocation calls) to monitor microbat presence and identify the different species in selected locations, with special attention given to installed microbat boxes. The monitoring will help determine future action needed to preserve and enhance the habitat of these environmentally-friendly 'insect pest terminators'.

CONTENTS

INTRODUCING MICROBATS

Microbats are small, nocturnal, flying mammals which eat insects. They make up almost 25% of Australia's native mammals, with 18 of the 33 or so New South Wales species having been found in and around the Young district.

All microbat species are **PROTECTED**, meaning that it is illegal to kill, injure or disturb them or their habitat, and some species are also **VULNERABLE**, meaning that they are facing a high risk of extinction in NSW in the medium-term future if their habitat is not maintained.

Due to a lack of local research, it is not known which species are common, uncommon, or rare and in urgent need of help in our region.

Microbats have longer life spans than other mammals the same size (eg mice), and together with a low reproductive rate (1 or 2 young per year), they are more likely to suffer population decline. Many live for 10 years, with some individuals known to be at least 30 years old.

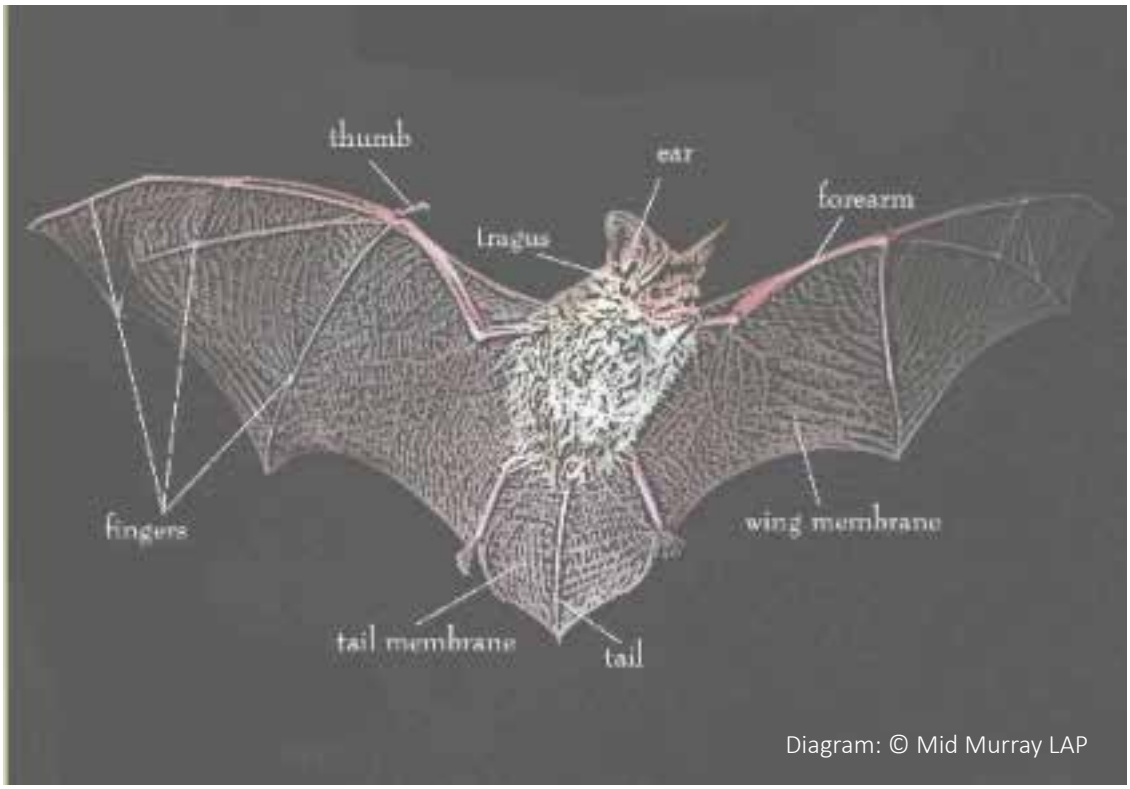


Diagram: © Mid Murray LAP

MICROBAT BODY PLAN

The smallest microbat in the Young district has a head/body length ranging from 34.7mm to 48mm (Little Forest Bat), whilst the body of the largest can measure up to 86.5mm (White-striped Freetail Bat).

Their tail and wing membranes are fragile and prone to damage but heal remarkably quickly. Future research may present opportunities for the development of new wound treatments if we can determine how the bats achieve this feat.

HABITAT

A healthy habitat must provide both roosting and foraging sites with an ample insect food supply. It ideally contains a variety of local native vegetation (especially old hollow-bearing trees) to ensure the survival of the microbats. Caves, where they occur, also provide essential habitat for some species.

Different species have different habitat needs, and where the preferred habitat of native vegetation is scarce or not available, some species use parks and home gardens, buildings, culverts, bridges and abandoned mines for roosting and foraging.

Native vegetation in the Young district has been substantially reduced and modified by clearing since European settlement, with only small areas and isolated fragments left. Agriculture, mining and towns have changed the landscape by introducing new plant and animal species. Waterways have been modified and sometimes polluted, and new structures, including dams, have been added.

Fortunately many microbat species have survived these disruptions because they are more mobile and adaptable than some other native animals. However, their overall numbers and diversity have probably been reduced.

As well as larger areas of remaining native woodland and forest (eg Dananbilla Range), microbats can be found roosting and feeding in fragmented remnants of native vegetation along roadsides and watercourses. Recent research has highlighted just how important these remnants are in maintaining the number of microbats we still have in our agricultural areas. Large, isolated farm paddock trees, both dead and living, provide especially important foraging areas.

Dams and creeks with open water provide areas for drinking and feeding because of the many insects they attract, while breeding colonies may be found where suitable vegetation is within flying distance.

Young Arboretum has bat boxes for roosting. Photo: © Mikla Lewis

Paddock trees are important for foraging. Photo: © Mikla Lewis

Bridge for roosting and regrowth for foraging. Photo: © Mikla Lewis

ROOSTING

Microbats roost singly, in small groups or in colonies and require sites for three different purposes:

- shelter from predators and extreme day-time temperatures;
- shelter during torpor (a short form of hibernation lasting from hours to several days) or hibernation when food is scarce and winter temperatures are low.

* Torpid bats should **not be disturbed.** Waking up uses fat reserves they cannot replace when there is little food around **and they may die.**

- shelter for breeding, preferably near water or in humid areas. All locally occurring microbat species give birth to single or twin young each year, mostly during early summer when food is abundant. Young are suckled until able to fly and forage for themselves at 3-6 months of age.

Loose bark, crevices and hollows in both dead and living trees are preferred sites for most of our local species, but they will use suitable human-made structures (eg sheds, roof cavities and bat boxes) where suitable natural roosts are not available. Some microbats will roost in bird nests.

Fairy Martin nests can double as bat roosts.
Photo: © Mikla Lewis

Chocolate Wattled Bat colony in roof cavity.
Photo: © Australian Museum

Hollows and crevices in dead trees provide roosts. Photo: © Anne Lemon

FORAGING

Skull of the Southern Forest Bat (actual length 12.7 mm), showing the sharp, pointy teeth used to crunch its insect prey.
Photo: © Australian Museum

Microbats navigate and forage using **echolocation**, a sophisticated form of sonar. They emit ultra-high frequencies from their nose or mouth, then use their ears to detect the pulses which bounce back from their surroundings. Most species can be identified by their echolocation call as recorded then analysed using an AnaBat Detector.

Except for the call of the White-striped Freetail Bat, the echolocation calls of the 12 microbats in the Young district cannot be heard by humans, although we can hear some of their 'chatter' as they communicate with each other.

Each microbat species has its own foraging, or combination of, foraging techniques:

- Some fly quickly, high above trees;
- Some fly and manoeuvre within or below trees;
- Some fly over water or open shrublands and grasslands;
- Many will pick insects off leaves and branches (gleaning);
- Some even land on the ground where they chase and catch their prey.

Insects can be caught in the mouth, or in the tail and wing membranes then transferred to the mouth.

Native vegetation and waterways provide the best foraging areas, but anywhere insects are plentiful is a potential feeding area.

A rescued Inland Broad-nosed Bat being fed a meal worm by a WIRES carer.
Photo: © Anne Lemon

IDENTIFICATION

Microbats found in the Young district belong to the families **Molossidae** (Freetail Bats) and **Vespertilionidae** (Evening Bats), with a good chance that the family **Emballonuridae** (Sheathtail Bats) is represented by the Yellow-bellied Sheath-tail Bat, which has been found in surrounding districts.

Microbats are normally harmless, **but should not be handled, whether dead or alive**, because they may carry the potentially fatal Australian Bat Lissavirus (ABLV), which is transmitted through scratches or bites. Currently, the Yellow-bellied Sheathtail Bat is the only microbat known to have transmitted ABLV to a human.

Contact your GP immediately if you are scratched or bitten.

The main identifying physical feature of a microbat is its tail and tail membrane (see diagrams below from Sue Churchill's book Australian Bats). The Sheathtail Bat tail protrudes through the upper surface of the tail membrane, which then forms a sheath over the rest of the tail (Family Emballonuridae). With Freetail Bats, the tail extends beyond the point at which the membrane encloses it (Family Molossidae), while in Ordinary Bats such as Evening Bats (Family Vespertilionidae), Horseshoe Bats (Family Rhinolophidae), Leaf-nosed Bats (Family Hipposideridae) and Bent-wing Bats (Family Miniopteridae), the tail is entirely enclosed by the tail membrane.

Sheathtail Bats

Freetail Bats

Ordinary Bats

Further descriptions of the twelve species found in the Young district are given in the following pages, although sometimes colours will vary. With some species only the male is readily identifiable by penis size and/or shape. The length of the forearm is also an important identifying feature.

Six other microbat species are known in surrounding areas and may be present in the Young district. They include the Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*), the Little Pied Bat (*Chalinolobus picatus*), the Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), the Eastern Bent-wing Bat (*Miniopterus schreibersi oceanensis*), the South-eastern Long-eared Bat (*Nyctophilus corbeni*) and the Large Forest Bat (*Vespadelus darlingtoni*).

All of these species, except for the Large Forest Bat (*Vespadelus darlingtoni*), are listed as Vulnerable under the NSW Threatened Species Conservation Act 1995.

Large-footed Myotis or Fishing Bat (Myotis macropus) trawls with its extra large feet – an important identifying feature. Image: Andrew Howells © Australian Museum

The books and websites listed on page 16 can be consulted for further information on any species.

Family: Molossidae

White-striped Freetail Bat *(Austronomas australis)*

Description: Weight: 30.5- 47.5g

Forearm: 57.2- 64.5mm.

The largest of the freetail bats with dark chocolate brown-black fur all over and bright white stripes under the wings where they join the body. Other white fur patches may be present on the chest. The ears are rounded, fleshy and point forward, and both sexes have a prominent throat pouch.

Habitat: Varied, including forests, woodlands, open agricultural landscapes with scattered tree stands, shrublands and town areas. Roost in hollows in old trees, under loose bark, in dead stumps and sometimes the ceilings of buildings, either singly or in a colony.

Behaviour: Fast flyers with narrow wings, they catch and eat **moths, beetles, bugs and larger flying insects** above the tree canopy. Also known as 'scurrying bats' because they sometimes chase and catch insects like **grasshoppers** on the ground.

Photo: © Michael Pennay

It is the only microbat in our region with echolocation calls that can be heard by humans – a sharp 'ting… ting' at one pulse per second.

Produce a single young mid December/late January.

NSW Status: PROTECTED

Family: Molossidae

Inland Freetail Bat

(Ozimops petersi) (previously Mormopterus petersi or Mormopterus species 3)

Photo: © Mid Murray LAP

Description: Weight: 6.9- 11.3g Forearm: 32.2- 37.9mm.

Fur is bicoloured; on the back it is light grey to light grey-brown with a creamy white base, and on the belly it is very light brown with a creamy white base. Known for its very flat head and body and, like other mastiff/freetail bats, for its mastiff-dog-like jowls. Males have a short penis (5mm), but females are hard to distinguish from the South-eastern Freetails.

Habitat: Common in **more arid** habitats with open woodlands (including cypress-pine woodlands) or shrublands, they seek areas of taller vegetation along creek-lines and drainage areas. Roost in tree hollows with small entrances, as well as cracks and fissures in trees and posts. They have also been found roosting between the beams and corrugated iron of roof cavities.

Behaviour: Being fast flyers, they tend to forage in open, unobstructed areas over tree canopies, water and along tree-lined creeks. Sometimes they land and crawl quickly over the ground or tree trunks to chase and eat prey such as **grasshoppers**. **Flies**, as well as **winged** and **wingless ants** have been found in stomach contents.

Produce a single young November/December.

This little bat has been tentatively included in our species list. Whilst a local WIRES rescue and subsequent identification suggests it lives here, it has not previously been found as far east as Young, and it is uncertain whether its presence was natural or assisted by human transport systems. The challenge now exists for our microbat monitoring program to help decide whether this microbat's presence indicates natural residence or accidental arrival.

NSW Status: PROTECTED

Family: Molossidae

South-eastern Freetail (Little Mastiff) Bat

(Ozimops planiceps) (previously Mormopterus planiceps or Mormopterus species 4)

Photo: © Mid Murray LAP

Description: Weight: 6.8- 13g Forearm: 30.6- 35.7mm.

Bicoloured fur; charcoal grey/brown (creamy brown base) on the back and pale brown (lighter base) on the belly. Like the Inland Freetail, it has a flat head and body and wrinkled jowls, but its fur is usually longer, shaggier and darker. Males have a long penis (9 mm) compared to Inland Freetails.

Habitat: A wide range of habitats, from tall, dry forests, open woodlands (box, ironwood, cypress-pine) to mallee, shrublands and grasslands, also adapting well to town areas. Small enough to squeeze through a hole the size of a man's thumb, they roost in tree hollows and crevices with small entrances, including the roofs of houses/buildings where colony numbers may reach several hundred. A large colony was recently found at a Murringo residence.

Behaviour: Flight is direct and fast over the tops of trees, along tree-lined creeks and roadways and at the outer edge of remnant vegetation, where they catch and eat insects in the air. Also land and crawl quickly over the ground or tree trunks to chase and eat **ants**, **bugs**, **beetles** and **moths**. An unpublished study in Victoria revealed that the diet of this species comprised up to **80% bugs**, mostly **Rutherglen Bugs**, a major agricultural pest species. Produce a single young December/January.

NSW Status: PROTECTED

Family: Vespertilionidae

Gould's Wattled Bat *(Chalinolobus gouldii)*

Description: Weight: 10- 20g

Forearm: 35.5 - 47.2mm.

Black fur on head and shoulders, often grading to a lighter brown towards the tail; usually brown on the belly. The muzzle is short with a large lobe of skin (wattle) at the corner of the mouth.

Habitat: Nearly all habitats, including eucalypt and cypress pine forests, woodlands, agricultural land and town areas. Roost in hollows in old trees and occasionally in the ceilings/basements of buildings, bird nests, rolled up canvas blinds, and even the exhaust pipe of a tractor. They have been recorded in the ACT in bat nest boxes.

Photo: © Michael Pennay

Behaviour: Forage in or just below tree canopies in forests, woodlands and open/modified vegetation, including isolated paddock trees. Feed on a variety of insects, mainly **moths** and **bugs**, but also **scarab beetles**, **caterpillars**, **crickets**, **locusts** and **flies**. They drink from waterways, dams and swimming pools. Form colonies of around 30 bats (more or less depending on the season), which are quite sensitive to disturbance. Hibernate or become torpid during the winter in southern areas. Produce twin young late November.

NSW Status: PROTECTED

Family: Vespertilionidae

Chocolate Wattled Bat *(Chalinolobus morio)*

Description: Weight: 5.5- 13g Forearm: 33- 42.4mm.

Chocolate brown fur all over, sometimes paler on the belly. There is a small wattle at the corner of the mouth.

Photo: A. Young © Australian Museum

Habitat: A wide range of habitats, including forests and woodlands, preferring continuous forests to small patches. Most roost in tree hollows and under loose bark, but also use old bird nests, houses, bridges and culverts.

Behaviour: Chocolate Wattled Bats feed mainly on **small moths**, but will also eat **beetles** and whatever **other aerial insects** are available. They fly moderately fast as they twist and turn whilst hunting their prey under the canopy of the forest and above shrubs. Females roost together in colonies of 6- 70 and males mostly roost alone. Colonies of up to 400 have been recorded in buildings.

In south-eastern Australia they become torpid during winter. In one area where they compete with up to 7 other microbat species, their torpor periods start later and finish earlier than the other species, enabling them to hunt without competition. Produce 1 or 2 young in November.

NSW Status: PROTECTED

Family: Vespertilionidae

Large-footed (Southern) Myotis

(Myotis macropus)

Photo: A. Young © Australian Museum

Description: Weight: 9- 14.9g

Forearm: 37.2- 42.9mm

Fur is normally dark grey to reddish brown above and paler below. Old bats have ginger-coloured fur, and albinism (or partial albinism) is not uncommon. They have exceptionally large feet (>8mm long).

Habitat: A microbat strongly associated with vegetated (uncleared) habitats having nearby permanent waterways and dams. Roost amongst dense vegetation, in tree hollows, caves, mines, culverts and under bridges close to water. Sometimes found roosting in roof cavities.

Behaviour: Sometimes called 'fishing bats', they fly close to water surfaces, 'trawling' with the curved claws on their large feet, catching **aquatic insects** and occasionally **small fish. Beetles**, **moths**, **mosquitoes** and **flies** (including **fruit flies**) form part of the diet they catch in the air.

Usually less than 15, though sometimes several hundred bats roost together in a colony. Males roost alone when not breeding and defend their territory, many older males acquiring scarred ears as a result of their aggressive encounters. Produce a single young November/December.

NSW Status: PROTECTED and VULNERABLE Comparatively rare over its range.

Family: Vespertilionidae

Lesser Long-eared Bat *(Nyctophilus geoffroyi)*

Photo: D. Whitford © Australian Museum

Description: Weight: 4.6- 14.5g Forearm: 32 - 41.7mm.

Fur is 'fluffy' and bicoloured, light grey-brown on the back and paler (or white) on the belly, with a dark base. Its ears are long (>19mm) and, unlike other members of the genus, it has a well-developed nose-leaf with a Y-shaped central groove.

Habitat: Varied, ranging from deserts to rainforests, woodlands and grasslands, they are common in agricultural and town areas. Roost in hollows and fissures in old trees, under bark, in old fairy martin nests, and occasionally in caves. Have adapted well to human presence and often roost in ceilings, hollow walls, unused roller doors and canvas awnings in towns. They are one of the most common microbats recorded in the Young district.

Behaviour: Hunt near the ground or under the tree canopy with a slow, highly manoeuvrable flight pattern. Catch and eat **flying insects** on the wing whilst spiralling around shrubs, but also snatch **flightless insects** off leaves and the ground where they will sometimes land. Mostly **moths**, **crickets** and **grasshoppers** are eaten. Often seen at night swooping around street lights. The long ears of this bat (and Gould's Long-eared Bat) may be used to listen for and locate 'noisy' prey such as **crickets** and **scuttling beetles**. Prefer the hollows of big old eucalypts for their maternity colonies of 10-15 females (with one adult male) and usually produce twins in late October/November. In winter they become torpid.

NSW Status: PROTECTED

Family: Vespertilionidae

Gould's Long-eared Bat *(Nyctophilus gouldi)*

Description: Weight: 9- 16.5g **Forearm:** 40- 47.7mm

Slate grey to grey-brown fur on the back with a light grey belly. Very long ears fold down when at rest and the muzzle ridge is moderately developed.

Photo: GB Baker © Australian Museum

Habitat: Found from very wet to arid environments, they occur here in sclerophyll forests and woodlands. More open areas including larger forest remnants are sometimes occupied, as are *Acacia* shrublands. Roost in tree hollows, fissures and under bark of eucalypts, but occasionally in buildings. Individuals are sometimes found in old bird nests.

Behaviour: Short, wide wings suggest slow, manoeuvrable flight in cluttered environments. Fly in large circles 2-5 metres high under tree canopies, and swoop close to the ground to catch **insects** in the air, or land to snatch **non-flying insects** (including **ants**) off the ground or leaves. Like the Lesser Long-eared Bat, it uses its ears to listen for 'sonar-sensitive' prey which have evolved flight patterns to avoid detection.

Up to 25 female bats may form a colony, although males generally roost alone.

Produce 1 or 2 young in late October. In winter they become torpid for long periods.

NSW Status: PROTECTED

Family: Vespertilionidae

Inland Broad-nosed Bat *(Scotorepens balstoni)*

Photo: R. & A. Williams © Australian Museum

Description: Weight: 6.3- 12.7g Forearm: 32- 40.5mm.

Variable dark brown to pale sandy fur on the back (mostly light grey-brown) with a pale brown belly; the base of the fur is obviously paler. When viewed from above its muzzle has a broad, square shape.

Habitat: A dry country species usually found in the vicinity of watercourses in open woodlands, shrublands and grasslands. Roost in hollows of old trees and occasionally in buildings where they share roosts with large colonies of South-eastern Freetail Bats. This roost-sharing behaviour was exhibited by a colony found in the Young district. Often roost in a horizontal position where hollows or crevices are thus oriented.

Behaviour: Fly quickly between trees, along forest edges and out into open areas, darting about to catch their prey in flight. Eat **beetles** with their strong jaws, as well as **slow-flying insects** and **mosquitoes**. They emerge from their roosts at sundown for maximum possible feeding time. Produce a single young mid November.

NSW Status: PROTECTED

Family: Vespertilionidae

Inland Forest Bat *(Vespadelus baverstocki)*

Description: Weight: 3.6- 5.6g

Forearm: 26.5- 31.4mm

Bicoloured fur on the back, light sandy brown to brownish grey with a grey base. Much lighter tricoloured belly fur with a dark brown base and creamy white tip. They may be confused with Southern Forest Bats (usually larger) or Little Forest Bats (usually smaller).

Habitat: Another dry country species; found in *Acacia*, *Callitris* and open eucalypt woodlands, shrublands and grasslands. Roost in tree hollows, including any found in small trees, and abandoned buildings.

Photo: © Michael Pennay

Behaviour: Fly with rapid wing beats and great manoeuvrability over a wide area, but what specific **insects** they eat is unknown. Being very small bats, it is highly likely that they include **mosquitoes** in their diet. Produce a single young in late November or early December.

Another microbat recently recorded for the first time in the Young district as a result of a WIRES rescue.

NSW Status: PROTECTED and VULNERABLE

Family: Vespertilionidae

Southern Forest Bat *(Vespadelus regulus)*

Photo: © Mid Murray LAP

Description: Weight: 3.6- 7g Forearm: 28- 34.4mm.

The bicoloured fur has a dark base, is reddish-brown to grey on the back and paler on the belly. It has a bare muzzle and can sometimes be distinguished from the Little Forest Bat by having forearms the same colour as the wings.

Habitat: Found in habitats ranging from closed forests to open and low shrub woodlands, they avoid highly fragmented remnants and open areas. Roost in hollows in old trees or under tree bark and occasionally found in houses. They hang together in groups of up to 100 and often share their roosts with South-eastern Freetail and Lesser Long-eared Bats.

Behaviour: Moderately fast and highly manoeuvrable, they feed on **insects** whilst flying in gaps between the tree canopy and the understorey. Eat **moths**, **beetles**, **flies**, **mosquitoes**, **ants** and **bugs**. Form maternity colonies in spring, produce a single young in late November/early December, and become torpid during winter.

NSW Status: PROTECTED

Family: Vespertilionidae

Little Forest Bat *(Vespadelus vulturnus)*

Description: Weight: 3- 6.5g Forearm: 23.5- 32.8mm.

The smallest bat of the Young district, it is lighter than a 10c coin and would easily fit into a matchbox. Fur is bicoloured with a darker base. Brown to pale grey all over with a lighter belly. Skin of the upper forearm is paler than that of the wing, and the muzzle is furred.

Habitat: Wet and dry sclerophyll forests to desert woodlands. Roost in hollows in trees (both dead trees and living trees with dead branches) with a number of small entrances, as well as in buildings and timber stacks.

Photo: © Australian Museum

Behaviour: Have a fluttery flight pattern, are agile and able to manoeuvre through tree canopies. Eat a range of small insects (lots of mosquitoes) as they fly, but will land on trees to eat larger prey they hold with the help of their tail membrane.

Up to 60 bats may roost together in a colony and some bats have been found sharing a nest with possums. They undergo long periods of torpor in winter roosts.

Produce a single young (sometimes twins) late November/December.

NSW Status: PROTECTED

ECOSYSTEM SERVICES

How Microbats can help us

Microbats are '**major players'** in both natural and built environments, helping to control populations of the wide variety of insects (eg moths, beetles, bugs, mosquitoes, grasshoppers, crickets, flies) they hunt. Flying takes a lot of energy so they eat up to at least half their body weight in insects each night. Recent research suggests some may eat up to 100% of their body weight per night, especially in the case of lactating females. This adds up to hundreds of insects a night and tonnes of insects a year.

M**icrobats** provide **ecosystem services** which benefit both human health and food production. They have expanded their more traditional role of maintaining the general health of our natural ecosystems and waterways to include many of our modified and agricultural landscapes.

Studies conducted in recent years are finding how important these small mammals are as natural biological controllers of insects in agricultural landscapes. In a recent book titled ***Bats in the Anthropocene: Conservation of Bats in a Changing World***, Chapter 6 is titled 'Bats in the Anthropogenic Matrix: Challenges and Opportunities for the Conservation of Chiroptera and their Ecosystem Services in Agricultural Landscapes' and emphasises the growing recognition of the value of microbats on a world-wide basis.

Reference: http://link.springer.com/chapter/10.1007/978-3-319-25220-9_6

With an increase in knowledge about the harmful effects (and increasing ineffectiveness) of many pesticides, and the rise of organic farms in the last few years, keeping as many microbat species in our agricultural environments as possible is important.

Following are just a few examples of the many ways microbats keep our environment healthy and productive:

- Small microbats are likely to prey on small insects such as **mosquitoes**, which spread diseases such as Ross River Fever and Barmah Forest virus. A study carried out on the Central Coast of NSW showed that one of our more common bats, the Little Forest Bat, ate large numbers of this insect.

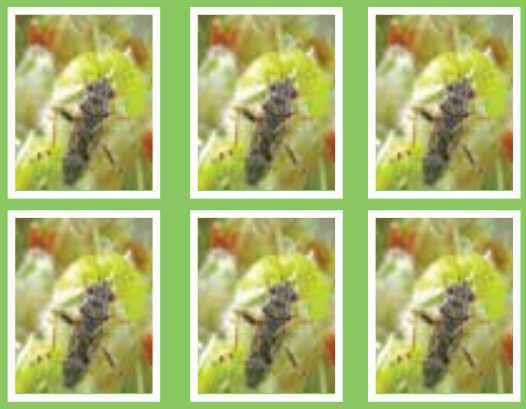
  Reference: https://cameronwebb.wordpress.com/2013/10/12/what-do-bats-eat-more-often-mosquitoes-or-moths/

Mosquito Photo: S. Humphreys © Australian Museum

- For a number of years it has been reported that under controlled conditions a ***Myotis*** **bat caught up to 1200 fruit flies in one hour**. The Large-footed Myotis was detected foraging over the creek at Young Arboretum in 2014. This local species could be an important ally for orchardists and horticulturists in their fight to control the **Queensland fruit fly**, as long as *Myotis*-friendly habitat is provided and maintained.
  Reference: www.ehp.qld.gov.au/wildlife/animals-az/micro-bats

Fruit Fly Photo: SCIENCEIMAGE CSIRO Entomology

- **Rutherglen Bugs** reduce yields in canola crops and plague home and organic gardeners with the feeding and sap-sucking abilities of both adults and nymphs. The South-eastern Freetail Bat, another of the more common bats of the Young district, was found to feed extensively on Rutherglen Bugs in a study conducted on the northern plains of Victoria (Lumsden and Wainer, unpublished data).
  Reference: http://dro.deakin.edu.au/eserv/DU:30023218/lumsden-ecologyandconservation-2004.pdf (see page 242).
  Search for **bats in rural landscapes** on the internet for more information.



Rutherglen Bug Photo: Qld Dept of Agriculture and Fisheries

Grain Moth and Beetle Photos: SCIENCEIMAGE CSIRO

- Studies carried out in a major grain growing area of Western Australia found that the local microbats fed solely on grain weevils.
  Reference: www.bats.org.au/about-bats/microbats.php

Cotton Harlequin Bug Photo: SCIENCEIMAGE CSIRO
Crop of Cotton Photo: SCIENCEIMAGE CSIRO Industry

- An Australian cotton farmer has been able to minimise pesticide use after cultivating a microbat-friendly environment. These small mammals (along with birds) now provide both night and day insect control services.
  Reference: http://cottoninfo.com.au/sites/default/files/documents/Insect%20management%20case%20study.pdf

- Studies in north-eastern NSW found that several microbat species ate a wide range of pest insects on a number of wool properties.
  Reference: www.snelandcare.org.au/landwaterwool/FS2_Bats.pdf

Sheep Blowfly Photo: R. Major © Australian Museum

- Corn fields in North America covered at night to **exclude** foraging microbats were found to have **greater** infestations of yield-reducing corn earworms (the larvae of a moth).
  Reference: http://news.sciencemag.org/environment/2015/09/bats-are-worth-1-billion-agriculture

Billions of dollars could be saved each year just through the reduced need for pesticides, as studies in both North America (see the corn fields study reference above) and Britain have indicated.

Reference: http://www.isciencemag.co.uk/blog/batting-away-pesticide-use/

THREATS TO MICROBATS

How we give Microbats a hard time

The **major threat** to microbats in the Young district is the **loss of roosting and foraging habitat**. Further fragmentation and clearing of the remaining forest and woodland areas, removal of standing and fallen trees (dead, alive or isolated) logging and clearing of more land for agriculture and housing will all play some part in reducing the volume and diversity of our microbat populations.

Other threats include:

- the use of pesticides (especially insecticides) which reduce available food for microbats;
- the accumulation of poison in microbats, as a result of eating sprayed insects;
- predation by cats on microbats in roosts and on the ground;
- collection of firewood;
- disturbance of breeding colonies;
- disturbance during winter torpor;
- barbed wire;
- natural cave destruction.

Microbats are normally harmless, but it is best to **avoid handling any bat, whether dead or alive,** because they may carry the potentially fatal Australian Bat Lissavirus (ABLV), which is transmitted through scratches or bites. Currently, the Yellow-bellied Sheathtail Bat is the only microbat known to have transmitted ABLV to a human.

Contact WIRES on 1300 094 737 if you find an injured bat. WIRES carers are specially trained and vaccinated.

Contact your GP immediately if you are scratched or bitten.

AN ACTION PLAN

How we can help Microbats

Services provided by microbats could be essential for the future health and productivity of our local agricultural and native ecosystems. More diverse native vegetation encourages more microbat species and abundance. Greater microbat numbers provide better control of insect pests. Help microbats by:

- preserving and enhancing existing habitat, including standing and fallen trees (dead, alive or isolated);
- planting a variety of native vegetation;
- installing some bat boxes (bat box information and plans can be found on the internet);
- making sure your dams and watercourses are not polluted;
- minimising your use of pesticides (insecticides and herbicides);
- keeping cats and dogs away from roosts and foraging areas and keeping them in at night;
- enabling microbats to escape if they accidentally fly inside your house, by opening doors and windows;
- sharing information about microbats and their important insect-eating services.

Your reward will be a free, effective, healthy pest control service.

Sharing information about microbats
Photo: © Mikla Lewis

Installing a bat box
Photo: © Anne Lemon

Planting microbat habitat
Photo: © Anne Lemon

MORE INFORMATION AND ACKNOWLEDGEMENTS

A lot of effort has been given to presenting accurate information, however research is ongoing and our knowledge is constantly growing and changing. The books and websites listed below have been used in the preparation of this booklet, and may also be used to obtain more in-depth or updated information.

Churchill, S. (2008) *Australian Bats* Second Edition Jacana Books (Allen & Unwin)

Parnaby, H. (1992) 'An Interim Guide to Identification of Insectivorous Bats of South-eastern Australia'. *Technical Reports of the Australia Museum Number 8* Sydney

Reardon T.B. et al (2014) 'A molecular and morphological investigation of species boundaries and phylogenetic relationships in Australian free-tailed bats *Mormopteris* (Chiroptera: Molossidae)' *Australian Journal of Zoology* 62(2) pp 109-136.

Strahan, R. (ed.) (1983) *The Australian Museum Complete Book of Australian Mammals* Angus & Robertson Publishers (updated 1995, Reed Books)

Australasian Bat Society - http://ausbats.org.au/

Australian Museum- http://www.australianmuseum.net.au

CSIRO – www.scienceimage.CSIRO.au

Ku-ring-gai Bat Conservation Society- http://www.sydneybats.org.au

Mid Murray Local Action Planning Association- www.midmurraylap.org.au

NSW Office of Environment and Heritage- http://www.bionet.nsw.gov.au

NSW Office of Environment and Heritage- http://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species

Qld Dept of Agriculture and Fisheries- http://www.daf.qld.gov.au

Qld Dept of Environment and Heritage Protection- http://www.ehp.qld.gov.au/wildlife/animals-az/micro-bat

Young District Landcare website - https://youngdistrictlandcare.org/

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Author- Anne Lemon

Editor- Mikla Lewis OAM

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