



# SQUIRREL GLIDER **HABITAT** **MANAGEMENT** **GUIDE**

A landholder guide for  
managing Squirrel Glider habitat  
in southern New South Wales



Local Land  
Services  
Murray



National  
Landcare  
Programme



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The information contained in this publication is based on knowledge and understanding at the time of writing (May 2017). However, because of advances in knowledge, users are reminded of the need to ensure that the information upon which they rely is up to date and to check the currency of the information with the appropriate officer of the Local Land Services or the user's independent adviser.

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# ABOUT THIS GUIDE

Squirrel Gliders occur in small isolated populations in southern New South Wales and make extensive use of roadside vegetation, as well as remnant vegetation on private land. Habitat management on private land and along roadsides forms a critical part of Squirrel Glider conservation in the Murray region.

This guide has been prepared for landholders and natural resource managers in southern NSW to provide practical information on the habitat requirements and management actions needed to conserve Squirrel Gliders. It contains general information on gliders as

well as detailed information on their habitat, shelter, food and breeding requirements. This information is based on current scientific research as well as information from individuals who have extensive experience and knowledge of Squirrel Gliders. Our knowledge of Squirrel Glider ecology is still very incomplete and many aspects of their ecology remain unknown.

This guide can be used by landholders and land managers to help develop an integrated whole-farm plan that incorporates agricultural production and biodiversity conservation.



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# THE SQUIRREL GLIDER

The Squirrel Glider (*Petaurus norfolcensis*) is a member of the possum family. Twenty-six species of possums are found in Australia. Six of these are gliding possums, five of which can be found in New South Wales. All gliding possums have a membrane, which is a thin sheet of skin that stretches either between the forepaws and ankles or between the elbow and knee and enables them to glide. When a glider holds its arms out to glide the membrane is stretched and acts as a parachute. All gliding possums are nocturnal, meaning they are most active at night.

Squirrel Gliders can be distinguished from Sugar Gliders (*Petaurus breviceps*) by their wide bushy tail.



Squirrel Gliders have white to cream coloured belly fur.

Gliding possums range in size from the Feathertail Glider (*Acrobates pygmaeus*), which is the smallest and has a head-to-tail length of 16 cm, to the largest - the Greater Glider (*Petaroides volans*), which has a head-to-tail length of 110 cm.

Four other species of gliding possum have been recorded in New Guinea, as well as islands off the coast of Australia.

## Description

The Squirrel Glider is a mid-sized gliding possum, weighing between 190 and 300 g, with a head-to-tail length of approximately 50 cm. It has greyish (blue-brown) upper body fur and a white-cream belly, a dark stripe which starts near the nose and finishes at the mid-back, and a wide-bushy tail. The gliding membrane of the Squirrel Glider runs between the forepaw and the ankle.

Squirrel Gliders can be mistaken for another gliding possum, the Sugar Glider (*Petaurus breviceps*) which occur in similar areas. However Sugar Gliders are smaller, with a less bushy tail and have greyish, rather than white-cream, belly fur.

A great way to observe gliders is by 'stagwatching'. Stagwatching involves the observer sitting quietly under a hollow-bearing tree or a stag (standing dead tree) just before dusk and waiting for waking gliders to emerge.



A Squirrel Glider showing its wide bushy tail.

## Range and status

Squirrel Gliders occur along eastern Australia, from north Queensland, through eastern New South Wales, and down to western Victoria, with two genetically distinct geographical groups, southern and northern/coastal populations. Typically Squirrel Gliders occur in parts of the landscape with fertile soils, generally below 300 m above sea-level. However, since European settlement many of these areas have been cleared and highly modified because of their suitability

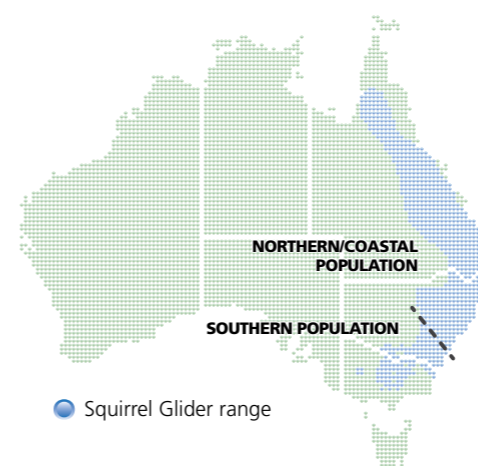
for agriculture. These changes have resulted in the loss of much of the best Squirrel Glider habitat.

While the Squirrel Glider has a wide distribution, it is considered rare throughout most of its range as it is restricted to areas where its specific habitat requirements are met. The loss of high quality habitat has led to Squirrel Gliders being listed as Vulnerable under the *NSW Threatened Species Conservation Act 1995*. They are likely to become endangered unless conservation actions are undertaken.

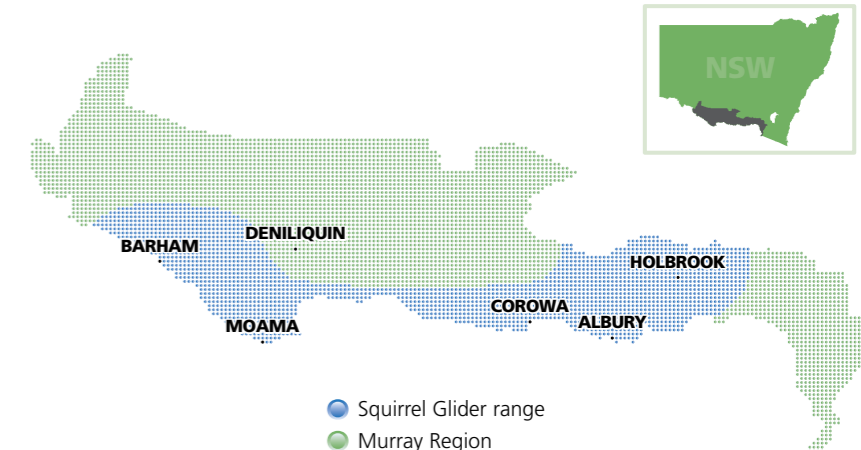
In the Murray region Squirrel Gliders appear to be restricted to the South-West Slopes of the Great Dividing Range, as well as riparian corridors along the Murray River further to the west.

Southern populations are genetically distinct from those distributed along the north coast. Southern populations may be particularly at risk because of their smaller population sizes and the highly fragmented nature of the woodland habitat that they rely on in this part of the world.

### SQUIRREL GLIDER DISTRIBUTION ACROSS AUSTRALIA



### SQUIRREL GLIDER DISTRIBUTION ACROSS THE MURRAY REGION



# SQUIRREL GLIDER HABITAT AND BEHAVIOUR

Acacia sap - can be a food source for Squirrel Gliders.

## Shelter

Squirrel Gliders make their home, known as a den, in the hollows of trees or stags (dead trees). In the warmer months gliders leave their dens just after dusk, and spend most of the night outside feeding, before returning to their dens just before dawn. During cooler months gliders may move around less as food resources are limited and they must spend more time resting to conserve energy.

Gliders use a variety of den sites in different parts of their territory and have been recorded using hollows in up to 19 different trees in a season. They tend to use den sites close to where they are feeding, often within 300 m. Gliders are social animals and a hollow can contain up to 10 gliders at a time. Denning in small groups is thought to be an energy saving strategy, particularly during cold winters.

Trees that may be commonly used by Squirrel Gliders for dens in the Murray region include:

- > Yellow Box (*Eucalyptus melliodora*)
- > White Box (*E. albens*)
- > Grey Box (*E. microcarpa*)
- > Mugga Ironbark (*E. sideroxylon*)
- > River Red Gum (*E. camaldulensis*)
- > Blakeley's Red Gum (*E. blakelyi*)

Den trees can be found in many areas that have not been cleared since European settlement, such as forests, creek-lines and along roadsides.

## Feeding

Squirrel Gliders have a seasonally varied diet that includes plants and invertebrates. Carbohydrates play a major role in the Squirrel Glider's diet and are mostly sourced from lerps, and plant products such as nectar, pollen, acacia sap, honeydew and manna. Insects such as caterpillars, cicadas and beetles contribute to the gliders' dietary protein. Gliders may play an important role in controlling outbreaks of insect pests, which attack leaves on eucalypts.

When eucalypt nectar is scarce, sap from acacia species such as Silver Wattle (*Acacia dealbata*) and Golden Wattle (*Acacia pycnantha*) which are favoured by Squirrel Gliders. Unlike sap from eucalypts, which becomes hard and brittle quickly, acacia sap becomes gum-like. Forests with mixed tree species provide enough variety in flora species so that a stable year-round food supply is available.

## Breeding & territories

Breeding often starts in late autumn to early spring, but can occur throughout the year. Females give birth to one or two young per litter and in some years can rear two litters. Young gliders are weaned from about five months, become independent at 12 months, and may live for up to five years.

Members of the same social group are often marked with scent by the dominant male in the group, who also marks certain points within the territory. This marking establishes territories that the group will defend from neighbouring groups to prevent them from using scarce resources.

Social groups usually consists of one or two males, one or two females and a number of young. Squirrel Gliders don't appear to form monogamous relationships, with all males and females in a group interbreeding. Breeding is not restricted to the social group and will also occur with individuals from neighbouring groups.

## Movement

Gliders mainly move about by climbing between the crowns of adjoining trees or by gliding between trees. The gliding process is called volplaning and the distance travelled depends on the height of the tree they are gliding from, with taller trees allowing longer glides. Squirrel Gliders can glide up to 80 m, but 20 - 40 m is more typical. Gaps greater than 70 m are considered a physical barrier to Squirrel Glider movement.

Being able to glide allows them to minimise the time spent on the ground where potential predators, such as foxes and cats, lurk. Individuals emerge from their dens and leap off tree limbs, extending their arms to spread the gliding membrane. As the individual glides it uses its tail as a rudder to steer. When the glider nears its target it folds its arms back to stop gliding. The individual then drops onto its intended target, holding its head back to stop it from hitting the tree.

In a single night gliders may move up to 2 km. The home range of Squirrel Gliders may vary from 0.7 to 12 ha, depending on the quality of the habitat. In areas with higher quality habitat Squirrel Gliders do not have to venture far to find the resources that they need to survive. In areas where habitat is poor, and vegetation is spaced further apart, gliders may be forced to move large distances and take greater risks to find the resources they need.



Social groups are usually made up of one or two males, one or two females and a number of juveniles.



# HOW YOU CAN HELP: Retain hollow-bearing trees

## THE PROBLEM

Clearing of vegetation, including single paddock trees, as well as road widening, are all processes that reduce the number of hollow-bearing trees. A reduction in hollow-bearing trees means less habitat for gliders and may limit their capacity to move around the landscape and breed with other populations.

## THE SOLUTIONS

### Retain hollow-bearing trees

The simplest solution is to retain existing hollow-bearing trees. Protecting this resource will ensure populations have a place to live and breed, as well as enabling gliders to move across the landscape, supporting connectivity between populations.

Gliders can use up to 19 different hollows throughout the year. Old hollow-bearing trees provide good foraging habitat as these trees usually flower more vigorously and are more likely to have rotting wood and peeling bark where insects can be found.



Even single paddock trees can provide suitable habitat for gliders as long as they are able to glide to other areas that provide alternative food sources. Retaining existing trees with hollows is a great solution as it requires the least cost and effort.

### Undertake revegetation

Hollows in trees take at least 100 years to form. Consequently, to have more hollow-bearing trees in the future we need to be planting more trees now. Old hollow-bearing trees will not last forever so we need to start actively replacing this resource.



A revegetation site near Burrumbuttock.



An old hollow-bearing tree next to an area having revegetation works undertaken.

### Nest Box Design

Nest boxes should be built using a rough, hardwood timber to ensure that gliders can climb on the box. The entrance hole should have a four centimetre diameter. The small size of the entry hole aims to restrict other animals from using the box. A number of five millimetre drainage holes should be drilled in the base of the box to prevent it from flooding. A lid on the top will mean the box can be checked easily. To make the box more comfortable wood shavings can be placed in the bottom.

Boxes should be checked at least twice yearly to ensure that bees have not invaded. Do not check boxes too regularly as this may discourage gliders from using the box.

Boxes ought to be placed between two and four metres above the ground. Nest boxes should also be placed on the leeward side of a tree, away from the prevailing weather and be well attached so as to avoid movement of the nest box.

If you are lucky enough to find a glider or other native animals in your box please don't touch or pat it. Gliders have very sharp teeth!

Under the *NSW National Parks and Wildlife Act 1974* handling of native fauna is not allowed except under license.

### Create artificial hollows (nest-boxes)

Where hollow-bearing trees have been removed artificial hollows may provide an adequate short-term substitute.

Nest-boxes are only a solution in those areas which have potential to provide suitable habitat for Squirrel Gliders. Therefore nest-boxes should only be installed if there are:

- Squirrel Glider populations nearby that can colonise the new site
- Abundant food resources such as flowering eucalypts and wattles

Nest box dimensions are an important factor as Squirrel Gliders have a particular preference.



A nest box with a rubber baffle to deter Indian Mynas, an aggressive introduced bird species that competes for nesting hollows.

# HOW YOU CAN HELP: Improve available habitat

## THE PROBLEM

Squirrel Glider habitat is often degraded and unlikely to sustain glider populations in the long term. Extensive clearing of native vegetation means that existing habitat has been fragmented into small "islands" that are not well connected. These small patches and the big distances between them will limit Squirrel Glider movement and reduce their opportunities for feeding and breeding.

## THE SOLUTIONS

### Improve connectivity between habitat

Squirrel Gliders need to be able to forage over a wide area to take advantage of different food sources throughout the year. However, their capacity to do so safely is limited by their ability to glide between trees. Filling in the gaps between patches of vegetation that are greater than 50 m apart enhances their capacity to move across the landscape. Consider planting individual trees, protected by stock proof guards, to create "stepping stones" to assist with safe movement.

Paddock trees, linear remnants and patches of vegetation can help create vegetation connections for Squirrel Gliders, though the passage for travel may be small it can still be vitally important.

Connectivity also plays a role in maintaining genetic diversity by allowing neighbouring populations to interbreed. If this does not occur populations may be more susceptible to disease and other conditions associated with inbreeding.

### Increase the size of existing patches

By increasing the size of existing patches of remnant vegetation we can increase the resources available to Squirrel Gliders.

Increasing patch size will also decrease the distance from other patches, which may be beneficial in providing access to resources and allowing gene flow.



Eucalypt woodlands are ideal habitat for Squirrel Gliders.



Mugga Ironbark (*Eucalyptus sideroxylon*) is a great nectar producing tree for Squirrel Gliders.

### Plant a diversity of plant species

Squirrel Gliders require habitats with a variety of plants so that a range of food sources can be provided over different seasons.

As the seasons change different food sources become available while others disappear temporarily. Landscapes with a diversity of plant life will provide food species for gliders throughout the year.

It is especially important to plant mid-storey species such as wattles, as these provide valuable sources of food. Contact Murray LLS for revegetation information and advice.

Improving available habitat for gliders will have a wide range of benefits for a variety of other species. Improving plant diversity will be beneficial for native birds, which rely on nectar and pollen and may need a variety of habitat structures. Improving connectivity may also help other animals move across the landscape.

### Managing grazing

Stock can prevent the regeneration of native species by either trampling seedlings or by eating them. Keeping stock out of a site for a time may give seedlings time to establish.

Improving habitat for Squirrel Gliders will also have benefits for other species such as the threatened Swift Parrot.



The Swift Parrot is endangered with only about 1000 pairs remaining in the wild, and its population is declining.

# HOW YOU CAN HELP: Reduce barbed-wire fencing

## THE PROBLEM

The introduction of barbed-wire fences has increased the risk of entanglement to Squirrel Gliders as they glide. If gliders do become entangled this can lead to death. Any barbed-wire fence is located in glider habitat should be considered dangerous, however those situated in riparian zones, between paddock trees, or at intersections of linear patches of vegetation, are considered especially dangerous.

## THE SOLUTIONS



A Squirrel Glider caught in a barbed-wire fence.

### Fixing existing fencing

For smaller sections of fence an alternative is to make the fence more obvious by installing metal tags along the top wire of the fence. Tags should be installed at a minimum of 30 cm intervals to ensure the fence is visible.

An effective short-term solution may be to install polypipe on the top two strands of barbed wire as these are where most entanglements occur.

Contact Murray LLS for free access to a polypipe applicator, available to make the process of installation quicker and safer.

### Replace or remove existing barbed-wire

The most effective way to remove the threat of barbed-wire is to remove it completely. Where fences no longer serve a necessary purpose this may be a viable option.

In places where fences are required for stock control, barbed-wire strands can be replaced with multi-strand high tensile plain wire or a combination of high tensile plain wire and ring-lock.

Barbed-wire is a threat to approximately 35 species across the Murray region, including various birds, possums and even larger animals such as kangaroos.

Electrified fences may be an alternative, although they need to be designed to ensure stock control is effective and wildlife are not electrocuted.

Below: Barbed-wire concealed with irrigation polypipe.



# HOW YOU CAN HELP: Reduce feral predator numbers

## THE PROBLEM

Since European settlement, cats and foxes have been introduced into Australia. Cats and foxes both hunt at night and Squirrel Gliders are a convenient sized prey for them to catch.



A Goanna; a natural predator of the Squirrel Glider.

## THE SOLUTIONS

### Responsible cat ownership

Responsible cat ownership is extremely important to reduce their impact on native wildlife.

Keeping your cat inside your house at night time is one of the best ways to protect Squirrel Gliders and other nocturnal wildlife from cats.

A number of council areas now impose cat curfews to restrict movement of cats, particularly during the night when they do most of their hunting.

Ensure that your cat is desexed to keep it from producing unwanted litters. Registering your cat with the local council and having it microchipped will allow it to be returned to you if it is found.



### Reduce fox numbers

Foxes are widespread and abundant across the agricultural landscape. Undertaking fox control activities will reduce their abundance and result in less pressure on Squirrel Gliders. These actions will also have benefits for other species such as native birds, reptiles and frogs.

A coordinated baiting program over a large area is most likely to be successful in reducing fox numbers.

Contact Murray LLS to assist you in developing a fox control program for your area.



# GOOD NEWS STORIES ABOUT SQUIRREL GLIDERS

While Squirrel Glider populations are threatened, community groups are helping these populations recover. Several projects have engaged communities to undertake simple actions that address threats to Squirrel Gliders.

## Squirrel Gliders in an agricultural landscape

Burrumbuttock is a small town 35 km northwest of Albury. Much of the land was cleared to make way for agriculture with small remnants being left along roadsides, as well as on a few private properties.

Squirrel Gliders had not been seen in the area for many years until an injured glider was found in 1995. Since then a coordinated approach has been taken to protect the remaining habitat in Burrumbuttock, including removing barbed-wire fences, planting new food trees and installing nest-boxes in some areas.

The Burrumbuttock community, together with Murray Local Land Services and the NSW Office of Environment and Heritage, launched the Squirrel Glider Local Area Management Plan project in 2013. This project aims to secure the Burrumbuttock Squirrel Glider population in the long term by increasing the connectivity and extent of suitable habitat in the area.



## SQUIRREL GLIDER MONITORING

A range of techniques are used by ecologists and land managers to monitor and survey Squirrel Glider populations. Some of these methods include checking nest boxes and hollows, placing motion-sensor cameras in areas where Squirrel Gliders might occur, trapping Squirrel Gliders, and using funnel-like hair traps that collect small amounts of fur from any animal that enters them. The hair can be analysed later by experts to determine what animal they belonged to.

All activities involving wildlife typically require a permit or scientific licence from the relevant authority, and sometimes even approval from an animal ethics committee. If you, or another land manager, are planning to undertake survey or monitoring work for wildlife in NSW please check the licence requirements with the Office of Environment and Heritage.

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## REPORTING INJURED GLIDERS

If you happen to come across an injured glider there are a number of organisations that may be able to provide assistance. Wildlife Information Rescue & Education Service (WIRES) groups operate across NSW and in some cases the local office of the NSW National Parks & Wildlife Service may also be able to assist.

**WIRES can be contacted state-wide on 1300 094 737 or visit [wires.org.au](http://wires.org.au)**

## FURTHER INFORMATION

Contact us for more information on Squirrel Gliders, or activities you can undertake to protect them:

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Squirrel Gliders can be found in the suburb of Thurgoona.

## Squirrel Gliders in a residential landscape

Thurgoona is a suburb of Albury. Like many residential areas most of the remnant vegetation has been cleared. However, some larger trees can still be found scattered throughout the area, and in the 1970s numerous plantings of native species took place.

Today Squirrel Gliders can still be found across much of the suburb, making extensive use of both remnant trees as well as the plantings. A number of the plantings contain nest-boxes with evidence that many are being used by Squirrel Gliders.

Several local community and school groups in the Thurgoona area are working together to address threats to Squirrel Gliders. Organisations such as the Albury Conservation Company are supporting Thurgoona's Squirrel Glider population by working with community to install nest boxes and monitor local gliders.



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