Squirrel Glider Habitat Management Guide

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

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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. Management of habitat on private land and within the roadside network forms a critical part of the conservation of the Squirrel Glider within the Murray Catchment.

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 needs for shelter, food and breeding. 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 is unknown.

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

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 within New South Wales[5]. All gliding possums have a membrane, a thin sheet of skin, which stretches either between the forepaws and ankles or between the elbow and knee, and enables them to glide. When the 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.

Gliding possums range in size from the Feathertail Glider *(Acrobates pygmaeus)* which is the smallest and has a head to tail length of 16cm, to the largest – the Greater Glider *(Petaroides volans)*, which has a head to tail length of 110cm[5].

Four other species of gliding possum have also been recorded in New Guinea as well as a few islands off the coast of Australia[5].

Description

The Squirrel Glider is a mid-sized (~190-300g) gliding possum with a head to tail length of ~50cm[5]. 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[1].

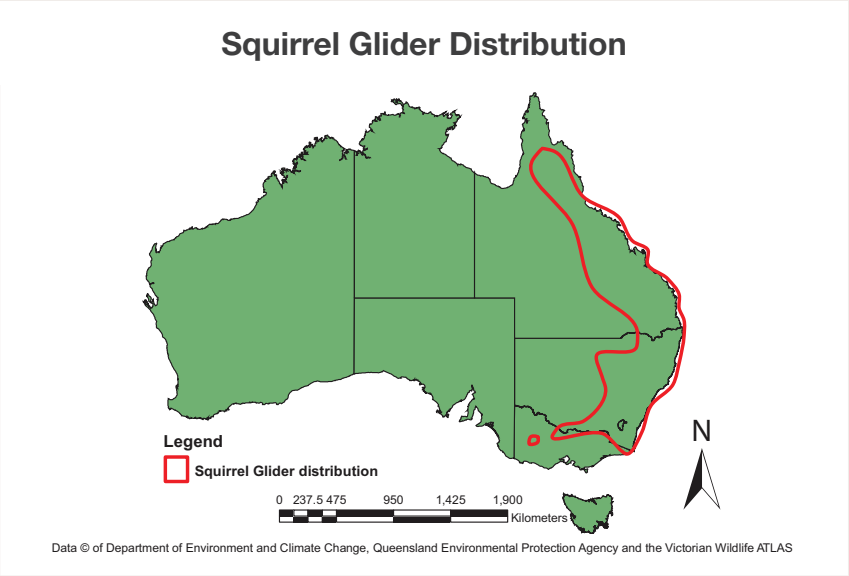
A Squirrel Glider caught during a wildlife survey in Albury, NSW.

Squirrel Gliders can be mistaken for another gliding possum, the Sugar Glider *(Petaurus breviceps)* which occur in similar areas. However Sugar Gliders are smaller (~90-150g) and have greyish, rather than white/cream, belly fur[5].

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 freshly waking gliders to emerge.

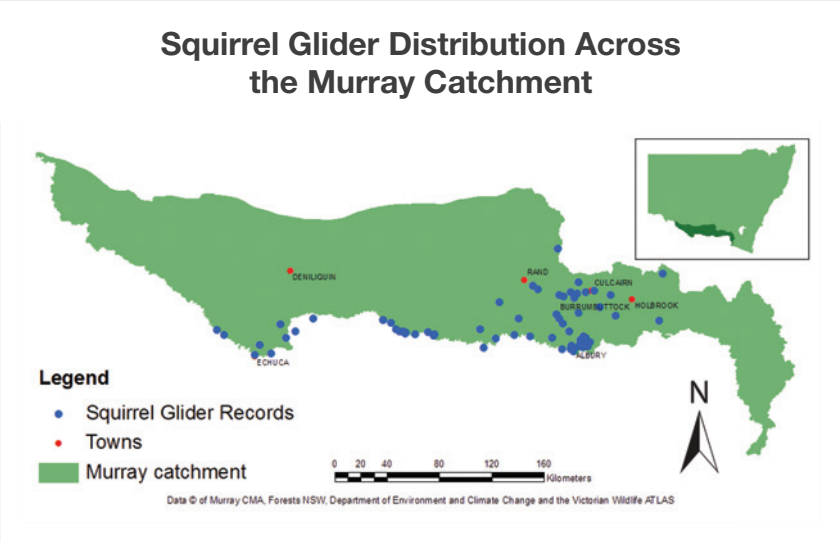
Range and status

Squirrel Gliders occur along eastern Australia from north Queensland, through eastern New South Wales, and down to western Victoria, generally below 300 metres above sea-level[1]. Typically Squirrel Gliders occur in parts of the landscape with fertile soils. 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[1].



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. Because of the loss of high quality habitat Squirrel Gliders are now listed as Vulnerable under the NSW Threatened Species Conservation Act 1995 which means they are likely to become endangered unless conservation actions are undertaken.

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



Squirrel Glider habitat and behaviour

Shelter

Squirrel Gliders make their home, known as a den, in the hollows of trees or stags (dead trees)[1]. 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 movement bouts can be shorter as food resources are limited and gliders 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 within a season[6]. Gliders are highly social and a single hollow can contain up to ten gliders at a time[9]. Denning in small groups is thought to be an energy saving strategy, particularly during cold winters.

Trees which may be commonly used by Squirrel Gliders as dens in the Murray Catchment include[3]:

- Yellow Box *(Eucalyptus melliodora)*
- White Box *(E. albens)*
- Grey Box *(E. microcarpa)*
- Mugga Ironbark *(E. sideroxylon)*
- River Red Gum *(E. camaldulensis)* and
- 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[3].

A den tree for Squirrel Gliders.

Acacia sap - a food source for Squirrel Gliders.

Feeding

Squirrel Gliders have a seasonally varied diet which includes plants and invertebrates. Carbohydrates play a major role in the Squirrel Glider's diet and are mostly sourced from plant products such as nectar and pollen and also honeydew and manna[5]. Insects such as caterpillars, cicadas and beetles contribute to the gliders' dietary needs for 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)* is favoured by Squirrel Gliders[2]. Unlike sap from eucalypts which becomes hard and brittle quickly, acacia sap dries differently and becomes gum-like. Forests with mixed tree species provide enough variety in flora species so that a stable year-round food supply is available[3].

Breeding & territories

Breeding often starts in late autumn to early spring, however it can occur throughout the year. Females give birth to 1-2 young per litter and in some years can rear two litters[6]. Young gliders are weaned from about 5 months and become independent at 12 months, and may live for up to five years[6].

Members of the same social group are often marked with scent by the oldest or dominant male in the group, who also marks certain points within the territory[5]. This process of marking establishes territories, which the group will defend from neighbouring groups to prevent them from using the scarce resources.

Social groups are usually made up of one or two males, one or two females and a number of juveniles[6]. Individuals don't appear to form monogamous relationships with all males and females in a group interbreeding. Breeding is not restricted to within 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 100 metres, however 30 to 50 metres is more typical[7]. 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 and when it is close to its intended target it folds its arms back in to stop gliding. The individual then drops onto its intended target, holding its head back.

A Squirrel Glider taking flight after nightfall.

In a single night gliders may move up to 1.6km[8] and it is estimated that social groups have a home range of up to 9 hectares[8], 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[4]. In areas where habitat is poor gliders may be forced to move large distances and take greater risks to find the resources they need.

How you can help -
Protect hollow-bearing trees

Hollow-bearing trees are critical to the survival of Squirrel Gliders as this is where they live and breed. Gliders can use up to 19 different hollows throughout the course of a year and therefore areas with a greater density of hollows can generally support higher populations of Squirrel Gliders.

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.

The current problem

Broad scale clearing of vegetation, clearing of single-paddock trees, as well as road widening, are all processes that are reducing the number of hollow-bearing trees[1]. 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.

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 ensuring connectivity between populations.

Even single paddock trees have been found to provide suitable habitat for gliders so long as they are able to glide to other areas that can provide alternative food sources. This is a great solution as it requires the least cost and effort.

Undertake revegetation

Hollows in trees take at least 100 years to form[1], therefore 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.

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

Allow regeneration

Allowing regeneration of native vegetation is a cost-effective way to increase the amount of glider habitat on your property.

To increase the likelihood of natural regeneration it may be necessary to carry out weed control and exclude the area from grazing by stock until the vegetation becomes established.

Fencing off areas near existing remnants to protect them from stock will allow those trees to regenerate naturally and increase the size of these remnants.

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 and
- Abundant food resources such as flowering eucalypts and wattles.

Nest Box Design

Next boxes should be built using a rough timber to ensure that gliders can climb on the box. A 4cm entrance hole should be placed on the box.
The small size of the entry hole aims to restrict other fauna from using the box. In the base of the box a number of 5mm drainage holes should be drilled to prevent the box 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 taken over the boxes. Do not check boxes too regularly as this may discourage gliders from using the box.

Boxes should be placed between 2 and 4m above the ground with the entrance close to the tree. Nest boxes should also be placed on the leeward side of a tree, away from the prevailing weather.

If you are lucky enough to find a glider or other native fauna in your box please restrain from touching or patting the animals. Gliders have very sharp teeth!

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

A nest box in a young tree.

How you can help -
Reduce barbed-wire fencing

Squirrel Gliders glide from tree to tree in hunt of food.

The current problem

The introduction of barbed-wire fences into the landscapes across Australia 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 that 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.

Solutions

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 areas where fences are required for stock control barbed-wire strands can be replaced with plain wire.

Removing barbed-wire or minimising its use can reduce the threat to a wide range of species. Barbed-wire is a threat to approximately 35 species across the Murray Catchment including various birds, possums and even larger animals such as kangaroos[9].

A Squirrel Glider caught in a barbed-wire fence.

The Murray CMA has a wildlife friendly fencing fact sheet which provides more information on this issue.

Glider habitat made safe by concealing barbed-wire with irrigation polypipe.

Fixing existing fencing

Where cost or on-going function is an issue 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. The Murray CMA has a polypipe applicator available to make the process of installation quicker and safer. For free use of this device contact your local Implementation Officer.

How you can help -
Reduce feral predator numbers

Prior to European settlement Squirrel Gliders had few predators other than owls and goannas[7].

The current problem

Since European settlement cats and foxes have been introduced into Australia, this has meant an increase in species that prey upon the Squirrel Glider. Cats and foxes both hunt at night and Squirrel Gliders are a convenient sized prey for them to catch.

Solutions

Responsible cat ownership

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

Keeping your cat inside at night time is one of the best ways to protect squirrel gliders and other nocturnal native wildlife from cats.

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.

A Goanna; a natural predator of the Squirrel Glider.

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.

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

Contact your local Livestock Pest and Health Authority for assistance in developing a fox control program in your area.

How you can help -
Improve available habitat

Squirrel Glider populations can be found in both small patches of remnant vegetation as well as in large patches. Smaller sites generally contain smaller populations while higher population densities can be sustained at larger sites because the resources required by Squirrel Gliders are more abundant.

The current problem

Current Squirrel Glider habitat is often quite degraded and may not provide enough resources for long term survival. As a result of land-clearing for agriculture there are now a greater number of patches, however, they are smaller in size. Having a larger number of smaller patches means that patches are likely to be isolated from one another which may limit the movement of Squirrel Gliders. These issues are likely to mean that fewer gliders can survive.

Solutions

Improve and protect 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 this safely is limited by their ability to glide between trees. Filling in the gaps between patches of vegetation that are greater than 50m apart will greatly enhance the Squirrel Gliders capacity to move across the landscape.

Paddock trees and linear remnants have been found to be sufficient in providing connectivity for glider populations, so even 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.

A woodland of eucalypts is ideal glider habitat.

Solutions

Plant a diversity of flora species

Squirrel Gliders require habitats with a variety of flora 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. An area that has a wide variety of flora species will be better able to provide more food options throughout the whole year. It is especially important to plant mid-storey species, such as wattle, as these provide a valuable source of food.

Contact your local Murray CMA Implementation Officer for information on suitable species to plant in your region.

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

Managing grazing

Stock can prevent the regeneration of native species by either trampling or grazing seedlings.
Keeping stock out of a site for a period of time will give seedlings a chance to establish.

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 be beneficial in helping other fauna move across the landscape.

Improving habitat for gliders will have benefits for many other species including the threatened Swift Parrot.

Good news stories about Squirrel Gliders in the Murray Catchment

Numerous Squirrel Glider populations are under threat but through a few simple actions undertaken by community groups these populations are recovering. Many projects have been very successful in engaging community members and groups as well as addressing a number of the threats that Squirrel Gliders face.

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.

The project was successful due to strong community involvement and support, and by addressing multiple threats to Squirrel Gliders in the region.

Squirrel Gliders survive in the linear remnants of vegetation at Burrumbuttock.

Squirrel Gliders in a residential landscape

Thurgoona is a residential area just outside of Albury. Like many residential areas most of the remnant vegetation has been cleared, however, some larger trees still can be found scattered throughout the area and in the 1970's numerous plantings of native tree 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 plantings[1]. Many of the plantings contain nest-boxes and evidence of utilisation by Squirrel Gliders remains high.

As with the Burrumbuttock project the Thurgoona project had high levels of community involvement. Landcare and school groups have helped to address a number of the threats including removal of barbed-wire and providing nest boxes, again showing that a multi-faceted approach works well.

Squirrel Gliders are widespread across the suburb of Thurgoona.

Reporting injured gliders

If you 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 National Parks & Wildlife Service may also be able to assist.

WIRES can be contacted state-wide on 1300 094 737

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