SQUIRREL GLIDER

CONSERVATION ACTION STATEMENT

June 2005

BRISBANE CITY

Dedicated to a better Brisbane

SQUIRREL GLIDER

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1.0 Introduction

Brisbane is recognised as one of the most biologically diverse capital cities in Australia, supporting some 1500 plant species, 523 vertebrate animal species and innumerable invertebrate species.

Brisbane is also part of one of the fastest growing urban regions in Australia. This growth is placing significant pressure on the ecosystems and wildlife of the city. Population pressures and urban development, resulting in the loss and fragmentation of habitat, continue to be the greatest threats to the protection of biodiversity (Brisbane SOE 2001). Since 1990 the rate of clearing has decreased markedly. However, even with no further loss of habitat, some existing flora populations within the city are at risk of local extinction because the small, isolated, remaining habitat areas cannot support them. Other significant threats include pest animals and plants and inappropriate fire regimes. The challenge is to maintain and restore the city's biodiversity while accommodating urban growth.

Brisbane City Council has responded to this challenge with the Brisbane City Biodiversity Strategy, an important part of Council's *Living in Brisbane 2010* vision for a clean and green city. The strategy outlines a range of initiatives designed to secure the long-term conservation of the city's outstanding biodiversity values using available public, community and industry resources. Conservation Action Statements are among these initiatives.

Conservation Action Statements clearly state Council's management intent for the city's most threatened species, and outline key strategies and actions for their management in Brisbane.

This Conservation Action Statement addresses the squirrel glider *(Petaurus norfolcensis)*, which is identified as a significant species within Brisbane as per Council's Natural Assets Planning Scheme Policy (Brisbane City Council 2000, *Brisbane City Plan*, vol 2, schedule 4).

This Conservation Action Statement will be updated every two to five years to reflect new information and progress on conservation actions. For more information about this or any other Conservation Action Statement, visit Council's website at www.brisbane.qld.gov.au or phone the Council on 3403 8888.

1.0 Introduction continued...

Aims

This Conservation Action Statement details Council's management intent for long-term protection and conservation of the squirrel glider within Brisbane by:

- collating **existing information** on the distribution, ecology and management requirements of this species in Brisbane and surrounds
- identifying **key threats** that significantly impact upon this species in Brisbane
- identifying **gaps in existing knowledge** of the habitat and management requirements of this species and research priorities
- detailing **practical and affordable strategies and actions** that support the long-term protection and conservation of this species within Brisbane.

2.0 Conservation Status

The conservation status of a species will influence how it is managed. 'Threatened' species are typically accorded a more stringent management regime than 'common' species. Various conservation registers identify the status of fauna species at local, state, and national levels. The current conservation status of the squirrel glider is provided in **Table 1**:

Table 1: Official Conservation Status of Brisbane City's Squirrel Gliders

Species	Brisbane City[1]	Queensland[2]	National[3]
Squirrel Glider	Significant	Common	Not listed

1 Brisbane City Council 2000, *Brisbane City Plan 2000*, Natural Assets Planning Scheme Policy, vol. 2
2 *Queensland Nature Conservation (Wildlife) Regulations 1994* under the *Nature Conservation Act 1992*
3 *Environment Protection Biodiversity Conservation Act 1999*

3.0 Distribution[1]

National/State

- East coast of Australia from Cairns to central Victoria (Rowston et al. 2002; Suckling 1998; Quin 1995).
- Across south-east Queensland, excepting the Gold Coast and Toowoomba.
- Not found in altitudes above 300 metres (Bennett et al. 1991; Menkhorst et al. 1988; Quin 1993; Rowston et al. 2002).
- Bioclimatic profile of the species predicts a potential core population in northern New South Wales and south-east Queensland region (Quin et al 1996).

Footnote:
1 Unless otherwise stated, the information in this section is from BAMM Pty Ltd (2004).

3.0 Distribution[1] continued...

Local

The squirrel glider has been recorded at a number of locations across Brisbane, typically inhabiting suitable lowland dry eucalypt forest or woodland (Rowston 1998a; Rowston et al 2002; Beyer 2002). Areas throughout Brisbane identified as supporting squirrel glider populations include riparian bushland at Minnippi Parklands (Cannon Hill), Brisbane Forest Park, Toohey Forest, Karawatha Forest, Boondall Wetlands, Anstead, Wacol, Enoggera Military Reserve, Tingalpa Wetlands, Bulimba Creek.

Verified records of Squirrel Gliders in Brisbane are shown on **Map 1**.

4.0 Ecology

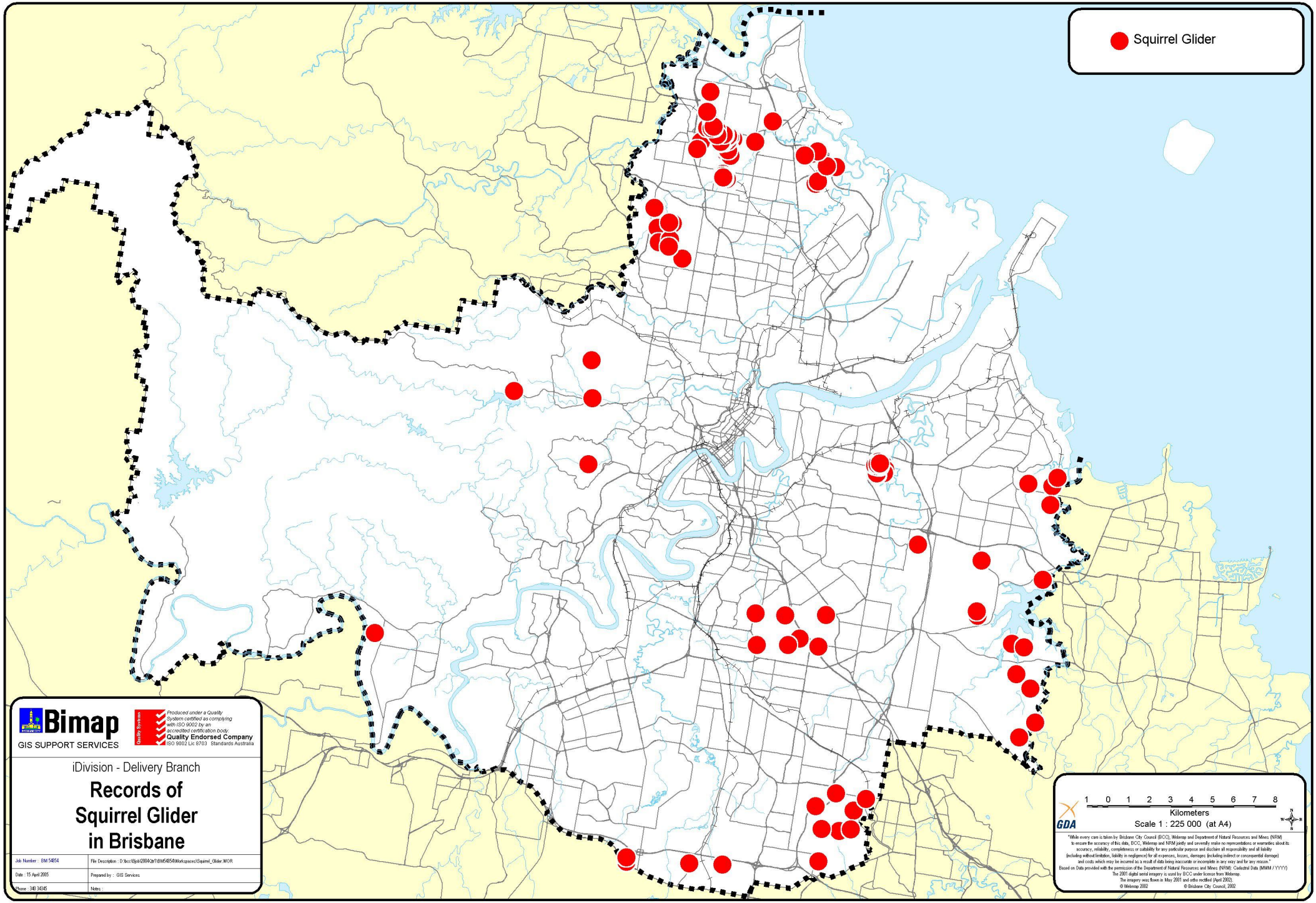
Habitat

- Only occurs in the drier forest types and strongly associated with eucalypt forest and woodland (Menkhorst 1995; Menkhorst et al. 1988; Quin 1993; Rowston 1998a; Traill and Lill 1997).
- Prefers vegetation communities that contain one or more species of iron-barked eucalypts *(Eucalyptus crebra, E. melanophloia, E. siderophloia* or *E. fibrosa)* and/or spotted gums *(Corymbia citriodora)*, often with mixed eucalypts.
- Absent from dense coastal ranges; not usually found in rainforest, high rainfall areas or near creeks (Beyer 2002; BMCS 2000; Rowston et al. 2002).
- Prefers stags (standing dead trees) and iron-barked eucalypts for nesting or refuge. A mixed aged structure allows for a continuous supply of this habitat (Rowston 1998b).
- Crucial refuges include deep gullies, unaffected by logging (Lunney 1987).
- Detected in areas as small as 10 hectares of suitable habitat (Rowston 1998a), but the size and the long-term status of these populations is unknown.
- Squirrel glider population densities of 0.89-1.54/hectare in the central north coast of New South Wales and 0.38/hectare in north-east Victoria have been reported.
- In a Fitzgibbon, Brisbane study Rowston (2000) recorded an average density of 1.06 animals/hectare and at some sites found 2.86 animals/hectare, the highest reported glider density known from any bushland area in Australia.

Diet

- Principally invertebrates (mostly moths and beetles), but also pollen and/or nectar (mostly eucalyptus species) and plant exudates eg. sap, resin.
- In south-east Queensland, squirrel glider invertebrate and plant foods are mostly found within the canopy of eucalypt forests and woodland; the understorey may increase the diversity and abundance of invertebrates that in turn provides a food source for this species (Rowston 1998a; Rowston et al. 2002).

Footnote:
1 Unless otherwise stated, the information in this section is from BAMM Pty Ltd (2004).


Squirrel Glider
Bimap
GIS SUPPORT SERVICES
Produced under a Quality System certified as complying with ISO 9002 by an accredited certification body.
Quality Endorsed Company
ISO 9002 Lic 8703 Standards Australia
iDivision - Delivery Branch
Records of Squirrel Glider in Brisbane
Job Number : BM 54854
File Description : D:\bcc\Bjob\2004Qtr1\BM54854\Workspaces\Squirrel_Glider.MOR
Date : 15 April 2005
Prepared by : GIS Services
Phone : 340 34345
Notes :
1 0 1 2 3 4 5 6 7 8
Kilometers
Scale 1 : 225 000 (at A4)
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"While every care is taken by Brisbane City Council (BCC), Webmap and Department of Natural Resources and Mines (NRM) to ensure the accuracy of this data, BCC, Webmap and NRM jointly and severally make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaim all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which may be incurred as a result of data being inaccurate or incomplete in any way and for any reason."
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4.0 Ecology continued...

Reproduction

- In south-eastern Australia, breeding usually begins in June or July, with a gestation period that lasts slightly less than three weeks (Suckling 1995; Nowak 1999) **(Table 2)**.
- Typically nests in a bowl-shaped, leaf-lined nest in a tree hollow.
- Females normally produce one to two live young, and are capable of raising two litters per year, but this may only happen if the first litter is lost (Quin 1995).
- The young remain in the pouch for approximately 70 days and are then deposited in the group nest for a further 40-50 days.
- The young are fully furred at approximately 70 days and eyes open at 84 days (Smith 1979).
- When 110-120 days old, the young begin to leave the nest to forage, usually in company with their mother.
- Typically, the young leave the nest at six months, although juveniles will remain in their natal range for approximately one year from the time of emerging from the nest, with juvenile males eventually experiencing aggression from the dominant male (Quin 1995).
- Juvenile mortality during dispersal is high, but established individuals are thought to survive for up to six years (Quin 1995). Typical family groups consist of a mature male of more than two years of age, one or more adult females, and the young of that season (Suckling 1995). Males have well-developed scent glands on their foreheads which they use to mark their territory (Suckling 1995).

Table 2: Breeding Seasons (green shading indicates breeding months)

Species	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Squirrel Glider												

Movement Patterns

- Nightly movements of individuals are estimated at 300-500 metres, with the male displaying a greater propensity to travel (Quin 1995).
- Gliders at Cannon Hill move 1-3 hectares overnight; their home range extends up to five hectares in the short-term (one to two weeks) and may exceed tens of hectares over a year (Catterall et al 1996).
- Observed to glide up to 100 metres with the aid of a downhill slope, and around 50 metres on relatively flat terrain within bushland (Rowston, pers. comm. 2001).
- Rarely found on the ground or in the lower habitat structure (Davey 1984), indicating that dispersal and recolonisation can only occur between linked bushland remnants.
- From research undertaken in Victoria, squirrel gliders can and do use narrow linear habitat remnants (as narrow as 20 metres), providing the vegetation is suitable (Van der ree, pers. comm. 2003).

5.0 Threats[2]

Habitat Loss

- Declining populations in the southern states are considered to be the result of loss of habitat through clearing for urban and agricultural development, and commercial timber harvesting (Menkhorst et al. 1988).
- Due to extensive clearing, less than 16% of the dry land area supports the glider's preferred habitat of dry eucalypt forests; this remaining habitat is highly fragmented and surrounded by human modified landscapes (Catterall and Kingston 1993).
- Habitat fragmentation caused by clearing and impediments such as barbwire fencing create a barrier to movement.
- Effects of adjacent built environments on squirrel gliders are unknown.

Loss of Nesting Sites

- Tree hollows in south-east Queensland are being destroyed much faster than they form in trees; destruction is largely due to clearing for development, and removal of dead or dying trees and tree limbs due to perceived safety threats (Rowston 1998b).
- Loss of available tree hollows to exotic and aggressive species, particularly common mynas and European bees.

Domestic Animals

- Animal care groups suggest that domestic animals (particularly cats) are a significant cause of squirrel glider mortality in urban areas (Caneris pers. comm. 2003)

Natural Predation

- Native predators include the powerful owl *(Ninox strenua)*, pythons (Family Boidae), and monitor lizards (*Varanus* spp.)

Footnote:
2 Unless otherwise stated, the information in this section is from BAMM Pty Ltd (2004).

6.0 Conservation

Several Brisbane City Council biodiversity initiatives are contributing to the protection and management of the squirrel glider and its habitat across the city. Key initiatives include:

- Bushland Acquisition Program: Through this program more than 1900 hectares of the city's most significant lowland habitats have been purchased and protected to date.
- Conservation Partnerships: More than 240 private properties have established conservation partnerships with Council, covering some 750 hectares of principally lowland habitats.
- Conservation Reserve Estate: More than 12,500 hectares of parkland, including 7000 hectares of bushland and wetland reserves are managed and protected. This reserve network provides habitat for Brisbane's significant species.
- Natural Assets Local Law: Under the Natural Assets Local Law 42% of the city area is now better protected from pre-emptive clearing.
- Brisbane City Council City Plan: The City Plan designates a green space system throughout the city to recognise and protect the contribution of open space areas to ecological functions. The City Plan's Biodiversity Code and supporting Ecological Assessment Guidelines provide performance criteria and acceptable solutions to protect significant biodiversity values on, or adjacent to, proposed development. The City Plan also includes statutory schedules of flora and fauna species considered significant in Brisbane, recognising species significant at a city-wide or regional level.

7.0 Research

Catterall et al. (1996) investigated the ecology of a squirrel glider colony in an area of approximately 270 hectares at Cannon Hill. This three-month study incorporated population density estimates, movement patterns and tree nest usage.

Hill (1997), as part of an honours study, assessed two different population viability analysis models using a theoretical population of squirrel gliders in Brisbane. This modelling highlighted the lack of information on the basic ecology of the squirrel glider in south-east Queensland, particularly its life history attributes. Based on the best available knowledge of squirrel glider ecology and population structure in the region, Hill concluded that this squirrel glider population could remain viable in the long term (at least 200 years) if there was no change in habitat availability. He also found that larger populations were more resistant than smaller populations, and that low connectivity between patches increased the chances of local extinction.

Rowston (1998a) conducted a four-year study of the habitat preferences, diet and some aspects of the ecology of the squirrel glider in the greater Brisbane region. This study involved seasonal arboreal trapping and habitat assessment at 27 sites, 12 of which were within Brisbane City limits. The results of this study are being prepared for publication (Rowston 1998b; Rowston et al. 2002; Rowston and Catterall in prep.)

As part of a collaborative study between Council and Southern Cross University, the population ecology of squirrel gliders across Brisbane's urban bushlands is being investigated.

These studies seek to gain a greater insight into local population sizes, densities and seasonal dynamics and so improve our understanding of the species' conservation status, habitat needs and management requirements, especially in fragmented urban habitats.

Artificial nest boxes have also been designed and tested as part of the three-year squirrel glider research within the Brisbane area. Preliminary information suggests that there are some viable options in installing nest boxes to supplement existing hollows (Beyer 2003).

8.0 Management Intent

Strategies

Brisbane City Council intends to contribute to the long-term conservation of the squirrel glider in the city by:

- adopting and encouraging innovative voluntary and statutory mechanisms that protect important habitats and movement corridors
- ensuring appropriate ecological assessment, reporting and survey procedures are adopted in the development, planning and management activities
- encouraging land management practices that avoid, or minimise, direct and indirect impacts on squirrel gliders and their habitat on both public and private lands
- ensuring the timely availability of accurate, adequate and contemporary information for policy, planning and management decisions
- facilitating research that targets priority information gaps and contributes positively to the conservation of Brisbane's squirrel gliders and their habitat
- providing the Brisbane community with appropriate information and opportunities to contribute in a practical way to better understanding and protecting Brisbane's squirrel gliders.

8.0 Management Intent continued...

Actions

Table 3 describes priority conservation actions that Brisbane City Council will pursue with its partners to address the stated strategies. These priority actions have been drawn from studies undertaken for Council by recognised glider experts and from consultation with a range of stakeholders. Actions will be undertaken as funds become available through Council's budgetary process. It should be recognised that Council must consider the timing of these actions against other priorities across the whole of the city.

Table 3: Management Actions

Management Aspect	Action	Timing	Lead Agent and Key Stakeholders
Habitat Protection	Conserve and protect important squirrel glider habitat on privately owned land within Brisbane, through Council acquisition of significant habitat (Bushland Acquisition Program) and conservation partnerships (Voluntary Conservation Agreements and Land for Wildlife)	Ongoing	Brisbane City Council (BCC)
Habitat Management	Develop squirrel glider habitat assessment guidelines incorporating appropriate methodology for assessing and reporting the presence and viability of squirrel glider populations.	2006	BCC
	Develop and implement a habitat linkage plan for significant squirrel glider populations at Bulimba Creek and Cabbage Tree Creek.	Commence 2005	BCC
Information Management	Develop a cost-effective monitoring program of Brisbane's squirrel glider populations, habitat and movement corridors.	Ongoing	BCC; Southern Cross University
	Map known movement corridors and habitat of the squirrel glider within Brisbane.	Commence 2005	BCC; Queensland Parks and Wildlife Service (QPWS); Queensland Museum
Community Involvement	Support two community-based squirrel glider surveys each year.	Commence 2005	BCC; QPWS; Queensland Museum

8.0 Management Intent continued...

Guidelines

The habitat protection and management guidelines detailed in **Table 4** are provided to better assist land owners, land managers, the development industry and the broader community in planning and undertaking land use activities that may otherwise may disturb the squirrel glider and/or its habitat. These guidelines are preliminary and will be refined as more information about this species and its habitat requirements becomes available.

Table 4: Habitat Management Guidelines

Issue	Guideline	Explanatory Notes
Retention of Habitat and Linkages	Protect and enhance known squirrel glider habitats and movement corridors where possible.	The primary impact on urban populations of squirrel gliders has been from loss of habitat, connectivity between remaining communities and loss of nesting sites.
Edge Effects	Prevent or minimise habitat fragmentation through appropriate development/land use design and location.	Edge effects may be mitigated through the use of substantial buffers and/or management of the major zone of disturbance (ie. 5-20-30m). Minimisation of edge-effects may reduce predation on squirrel gliders by feral and domestic animals and enhance the species utilisation of and movement through bushland patches.
Fire Management	Within known or likely habitat, maintain fire regimes that minimise fire related impacts.	Loss of hollow trees as den sites and loss of critical resources such as sap and pollen food trees are known threats for squirrel gliders. Inappropriate fire regimes have the potential to destroy den trees and food trees. Implementing an appropriate fire regime that limits the intensity of burns will assist in the protection of den and food trees.
Predation and Competition	Prevent or minimise predation on squirrel glider and competition with exotic species by reducing the presence of exotic pests from known habitats.	Remnant areas need to be actively managed to remove exotic pests which predate on the species or have potential to out-compete (eg. loss of nesting areas or food resources). It is necessary to enhance habitat linkages to prevent interactions with and limit exposure to, domestic pets.

9.0 Further Information

Agencies

- Australian Mammal Society (www.australianmammals.org.au)
- Brisbane City Council (www.brisbane.qld.gov.au)
- Department of Environment and Heritage (www.deh.gov.au)
- Environmental Protection Agency/Queensland Parks and Wildlife Service (www.epa.qld.gov.au)
- Queensland Museum (www.qmuseum.qld.gov.au)

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