

# Managing impacts of domestic cats in peri-urban reserves

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## Abstract

Impacts of domestic cats in peri-urban reserves may occur directly through predation, indirectly through disease transmission, by competition with native species and by supplementation of the feral cat population. Predation, in particular, has been the subject of increasing community concern and scientific research in the last decade which has resulted in increased pressure on local government to develop domestic cat control strategies. This literature review discusses domestic cat impacts in peri-urban reserves and management strategies for their control.

## Introduction

Peri-urban reserves are protected areas such as National Parks and nature reserves which are located on the periphery of urban areas (Environment Australia 2001). Impacts of domestic cats (meaning owned cats) in peri-urban reserves may occur directly through predation, indirectly through disease transmission, by competition with native species and by supplementation of the feral cat population (Paton 1993; Tidemann 1994; Dickman 1996). For the purposes of this review, significant impacts are those which significantly affect the population size of a native species.

Predation, in particular, has been the subject of increasing community concern and scientific research in the last decade which has resulted in increased pressure on local government to develop domestic cat control strategies (Barratt 1995a, 1995b). This literature review will discuss domestic cat impacts in peri-urban reserves and management strategies for their control.

## 1. Significance of domestic cat impacts in peri-urban reserves

### Direct impacts through predation

While it is generally accepted that domestic cat predation of native species occurs, the significance of impacts on prey populations is highly contentious (Fitzgerald 1990; Jarvis 1990; Nattrass 1992; Fougere 2000; Grayson and Calver 2004). Assessing the impacts of domestic cat predation is difficult because cats are just one of many environmental factors affecting prey populations including other introduced predators, habitat change and variable climate (Fitzgerald 1988; Nattrass 1992; Fougere 2000).

However, several case studies in the literature appear to demonstrate the adverse impacts of domestic cat predation on local wildlife populations (for examples, see Box 1). This view is reinforced by findings that feral cats have had adverse impacts on native species on islands and also on re-introduced endangered species on the Australian mainland (see Carter 1994; Dickman 1996).

*Box 1: Case studies demonstrating domestic cat impacts on local wildlife populations*

### 1. Stephen's Island Wren *Traversia lyalli* in New Zealand

A well known case identified by several authors (Fitzgerald 1988; Paton 1993; Dickman 1996) is the extinction of the Stephen's Island wren. In 1894, the lighthouse keeper's cat brought home 11 specimens which were identified as a new species (Oliver 1955). Within the same year, Oliver (1955) suggests, the wren was hunted to extinction.

### 2. Eastern barred bandicoot *Perameles gunni* in Hamilton, Victoria

Dickman (1996) cites a more recent example in Australia, involving the eastern barred bandicoot which declined to a small endangered population near Hamilton, Victoria by the late 1980s (Seebeck *et al.* 1990). Although a host of factors were responsible for the decline (Seebeck *et al.* 1990), feral and domestic cats were believed to have significant adverse impacts both directly by predation of juvenile bandicoots and indirectly by the transmission of the disease, toxoplasmosis (*Toxoplasma gondii*) (Lenghaus *et al.* 1990).

### 3. Superb lyrebird *Menura novaehollandiae* in Sherbrooke Forest, Victoria

Local populations of the superb lyrebird in Sherbrooke Forest declined in population numbers from approximately 120 birds in 1970 to around 60 birds in 1983 and were threatened with local extinction (Pergl 1994). It has been suggested that cats were responsible for a large proportion of the juvenile mortality (Larkin 1989, cited in Dickman 1996). Following introduction of cat control measures by the Sherbrooke Council, lyrebird numbers increased to 75 to 80 birds by 1994, and there was reported to be an increase in survival rates of young birds (Pergl 1994). Interpretation of these results is complicated by confounding effects such as concurrent fox control programs (1994), and possible habitat disturbance (Lill 1980, cited in Nattrass 1993). However, it appears likely that domestic cat predation played a role in the decline of the local lyrebird population, and that domestic cat control measures have, in part, contributed to recovery.

### 4. Anastasia Island beach mouse *Peromyscus polionotus phasma* in Florida

Paton (1993) cites a case in Florida of the Anastasia Island beach mouse (Frank 1992). The Anastasia Island beach mouse is an endangered nocturnal rodent which inhabits relatively undisturbed beach dune areas. Its population is restricted to a 14km barrier island in northeastern Florida. Domestic cat predation has been proposed as a major factor in the smaller population densities occurring in habitat adjacent to residential areas. Beach mouse density was shown to increase in the Anastasia State Recreation Area following cat control actions by the park in 1989 which resulted in a reduction in cat numbers (Frank 1992).

Arguments against the significance of domestic cat predation on native species have mainly centred on urban areas where it is suggested that the environment is highly modified and wildlife is likely to comprise the more common and adaptable species. However, it is increasingly acknowledged that native species in undisturbed peri-urban habitat are likely to be at high risk from domestic cat predation (Nattrass 1992; Barratt 1998; Fougere 2000; Gillies and Clout 2003; ACT Cat Working Party 2003; Grayson and Calver 2004).

Barratt (1997, 1998) proposes that populations of native species in undisturbed habitat adjacent to new residential developments are potentially at highest risk because of naivety to cat predation. The most susceptible prey species are likely to be less mobile and patchily distributed species, especially nocturnal mammals (Barratt 1998). As feral cat densities are much lower than for domestic cats (Paton 1993), Barratt's proposal appears sound. In the Canberra region, there is concern about the potential impacts of domestic cat predation on the legless lizard *Delmar impar* following urbanisation of areas surrounding native grassland remnants (Osborne and Williams 1991).

### Indirect impacts through transmission of disease

The most significant disease which can be transmitted from domestic (and feral) cats to wildlife is toxoplasmosis (Paton 1991; Dickman 1996). It is caused by a protozoan organism, *Toxoplasma gondii*, which has a world-wide distribution and affects most warm-blooded animals including humans (Dubey and Beattie 1998). Apart from its significance as a zoonosis (see Box 2), toxoplasmosis is a well-recognised cause of disease and mortality in Australian marsupials (Dubey and Beattie 1998; Munday 1988; Rose 1999).

#### Box 2: Public health concerns about Toxoplasmosis

The main threat posed by toxoplasmosis to humans is associated with prenatal infection and infection of immunosuppressed individuals such as HIV or cancer patients. In healthy adults symptoms may be subclinical or of a flu-like nature (Dubey 1994).

Most human infections are acquired by the ingestion of infective cysts in inadequately cooked meat, especially pork and lamb. Direct infection from cats through accidental ingestion of oocysts is less common, but has been a cause of public health concern. For example, an article in *The Canberra Times* (September 9, 2003) expressed concern about findings that 90% of Canberra primary school sandpits surveyed contained *T. gondii* oocysts, including 45% of sandpits protected by either fencing or covers (Lucas 2003).

Figure 1 shows the life cycle of *T. gondii*. Important points to note are that the cat is the definitive host, that is, the only species in which sexual stages of the life cycle take place, resulting in oocysts being shed in the faeces. (Dubey and Beattie 1998). A wide range of mammals and birds in Australia can act as intermediate hosts (Lenghaus *et al.* 1990). Infection in cats is most common in kittens and the main source is likely to be via ingestion of tissue cysts as they start to hunt birds and small mammals (Dubey and Beattie 1998). Strategies for disease prevention in humans include recommendations to confine cats indoors to prevent hunting (Dubey 1994).

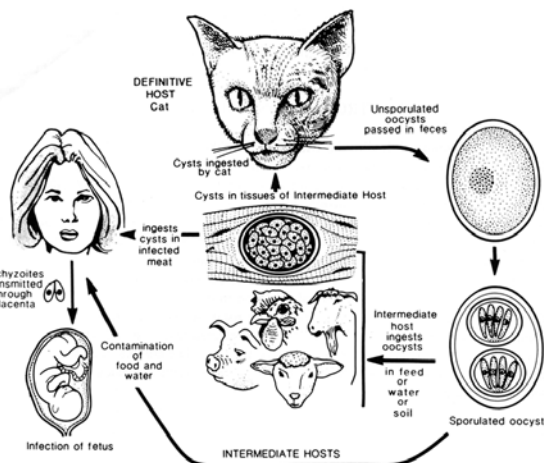


FIGURE 1. Life cycle of *Toxoplasma gondii*.

#### Figure 1: Life cycle of toxoplasmosis

Source: Dubey and Beattie 1988: 2

It has been proposed that toxoplasmosis is one of the factors contributing to the population decline of the eastern barred bandicoot *Perameles gunnii* in Hamilton, Victoria (Dickman 1996). Control of domestic and feral cats to manage the impacts of both predation and toxoplasmosis formed an important part of early recovery management plans for *P. gunnii* in Hamilton (Arnold *et al.* 1990).

### Competition

There is speculation in the literature that domestic cats impacts may also occur through competition with native species (see George 1974; Paton 1993; Dickman 1996). It has been suggested that competition is more likely to occur for food sources, rather than shelter and that potential susceptible species in Australia are likely to be carnivorous native species such as quolls *Dasyurus* spp., owls and nightjars (Dickman 1996).

### Supplementation of the feral cat pool

Impacts of domestic cats in peri-urban reserves may also occur through the supplementation of an existing pool of feral cats. Feral cats are well established throughout Australia (Burgman and Lindenmayer 1998) and maintain self-perpetuating populations (Dickman 1996), with supplementation from domestic and stray cat populations (Carter 1994). Feral cat control has been recognised as a national priority with development of a *Threat Abatement Plan for Predation by Feral Cats* introduced under the *Endangered Species Protection Act 1992* (C'th) (Environment Australia 1999). Strategies aim at their effective control, rather than eradication (which is impossible) from the mainland. It is widely accepted that improved management of domestic and stray cats is needed to reduce recruitment into the feral cat population (Carter 1994; Environment Australia 1999).

In summary, predation appears to be the most significant threat to wildlife in peri-urban reserves, particularly where undisturbed habitat is adjacent to new residential development. The importance of improved domestic cat control to reduce recruitment to the feral population is widely acknowledged. The impacts of toxoplasmosis and competition are difficult to quantify, but appear to be relatively minor threats.

## 2. Managing domestic cats impacts in peri-urban reserves

In the last decade there has been increasing interest in developing more effective cat control strategies to protect sensitive fauna in peri-urban reserves. Three State governments (South Australia, Victoria and New South Wales) and the ACT Government have implemented state-wide legislation for cat management (see Appendix 1). These Acts variously provide for local councils to enact cat control measures such as cat curfews and cat-free zones to help protect environmentally sensitive areas.

In Victoria, a *Cat Management Manual* has been developed to provide guidance to local government officers dealing with cat management issues. The manual assists in identifying environmentally sensitive areas such as peri-urban reserves and outlines regulatory options for protecting these areas from domestic cat impacts under the *Domestic (Feral and Nuisance) Animals Act* (DPI Victoria 2005).

Two well-known examples of local councils that have successfully implemented cat control to protect peri-urban reserves include Sherbrooke in Victoria (Staindl 1993; Pergl 1994) and Magnetic Island in Queensland (Scriggins and Murray 1997; Murray *et al.* 1999) (see Appendix 1). More recently, the ACT has introduced a 24 hour cat curfew to protect nature reserves adjacent to the proposed new suburbs of Forde and Bonner (ACT Government 2004). Kangaroo Island, South Australia, is currently in the process of implementing a strategy (Kangaroo Island Council 2005) (see Box 3).

In each of these examples, community consultation and education play a key role in the development and implementation of the cat control strategies. For example, the Magnetic Island and Kangaroo Island plans have both involved extensive surveys and consultation with key stakeholders prior to and during development (Scriggins and Murray 1997; Kangaroo Island Council 2005). Magnetic Island also undertook an extensive survey and review 14 months after implementation.

This review mainly focused on the level of community support, but also included an assessment of wildlife response to cat control based on residents' perceptions of whether populations of various native species were increasing, decreasing or unchanged (Murray *et al.* 1999).

A variety of measures have been used or promoted by local councils seeking to control domestic cat impacts in peri-urban reserves. These include cat confinement, night curfews, desexing and identification, cat bans and bellling cats. This section discusses their relative merits.

#### **Cat confinement (24 hour cat curfews)**

Cat confinement refers to confining cats at all times to owners' properties, either indoors or with access to an outdoor cat enclosure. Confinement has been advocated by several authors (Proulx 1988; Paton 1993; Seebeck *et al.* 1993) based on: the need to separate cats and wildlife; the need to prevent recruitment to the feral pool; the need to acknowledge the benefits of cat ownership; benefits to cat welfare; and decreased community nuisance from roaming cats.

A small number of local councils in Australia have implemented cat confinement (see examples in Box 3). In the ACT, a 24 hour cat curfew area has recently been declared for the proposed new suburbs of Bonner and Forde to protect adjacent Mulligans Flat and Gorooyarroo Nature Reserves (ACT Government 2004). The Kangaroo Island Council has developed a dog and cat management plan which includes provision for 24 hour cat confinement to owners' properties (except where cats are in a carry box or on a leash) (Kangaroo Island Council 2005).

Box 3: Use of cat confinement by local councils

#### **Casey City Council, Victoria**

In 1999, the Casey City Council introduced an Order under Section 25 of the *Domestic (Feral and Nuisance) Animals Act* of Victoria making it an offence for a cat to be found outside the owner's premises at any time. Cat confinement was chosen in preference to night curfews due to resident concerns about cat nuisance and attacks on wildlife at all hours of the day. There were also concerns about the practicalities of enforcing night curfews and that it may be difficult to provide proof that free-roaming animals were trapped during prohibited hours. Cat confinement is enforced with some discretion with officers responding to cat nuisance complaints rather than acting as roaming "cat catchers" (Baker 2001).

#### **"Little Burra", NSW**

A new rural residential subdivision in the Yarrowlumla Shire in New South Wales, "Little Burra", provides for cat confinement to protect fauna in adjacent sensitive woodlands by the use of a restrictive covenant applied to the lease. The covenant is applied under section 88B of the *Conveyancing Act 1919* (NSW) (Section 88B Instrument, DP270317). In this case, compliance appears to rely mainly on self-regulation and community peer pressure.

#### **Proposed new suburbs of Bonner and Forde in the ACT**

In 2004, a 24 hour cat curfew area was declared under Section 81(1) of the *Domestic Animals Act 2000* for the proposed new suburbs of Bonner and Forde, and the adjacent Mulligans Flat and Gorooyarroo Nature Reserves. The curfew aims to reduce domestic cat impacts on the nature reserves in the declared Cat Curfew Area and also recognises the additional benefits in terms of cat welfare and prevention of cat nuisance problems (ACT Government 2004). Section 81(1) states "If the Minister is satisfied that cats in an area are a serious threat to native fauna and flora in the area, the Minister may declare the area to be an area where cats must be confined to their keeper's or carer's premises at all times or during the stated times".

#### **Kangaroo Island, South Australia**

The Kangaroo Island Council has developed a dog and cat management plan which includes provision for 24 hour cat confinement to owners' properties (except where cats are in a carry box or on a leash). The *Dog and Cat Management Plan 2005* was approved by Council in June 2005 but is yet to be fully implemented (Kangaroo Island Council 2005). Kangaroo Island is a unique environment. Unlike the mainland, it has no rabbits or foxes (Paton 2003). Approximately a third of Kangaroo Island is reserve and ecotourism is a major industry. The agricultural community on the island has concerns about the high incidence of two cat-borne diseases, sarcosporidiosis and toxoplasmosis (Kangaroo Island Council).

The plan has been developed based on extensive surveys and consultation with key stakeholders and emphasises the importance of engaging the whole community. The aims of the plan are:

- To promote responsible cat and dog ownership on Kangaroo Island
- To protect native fauna from the negative impact of owned and un-owned dogs and cats
- To ensure public safety and reduce community conflicts by providing effective dog and cat control measures
- To reduce the negative impact of un-owned dogs and cats on Kangaroo Island's economy

Other measures recommended include mandatory identification, registration and desexing (unless a permit by way of "Breeder Registration" is obtained for the keeping of an "intact" cat). The plan endeavours to align cat regulation to existing dog laws as much as possible. Mandatory identification is an important measure to facilitate feral cat control on the island while providing protection for owned cats (Kangaroo Island Council 2005). State legislation (Section 76 of the *South Australia Dog and Cat Management Act 1995*) enables any unidentified cat to be seized, detained, destroyed or otherwise disposed of if found straying in areas where cat management officers have authority to exercise their powers.

Cat management strategies proposing cat confinement may be contentious. For example, in the mid-1990s a proposal to legislate for cat confinement as part of the Sherbrooke Local Council cat laws, resulted in high levels of public debate and media attention. Consequently, this proposal was rejected by Council and eventually night curfews were accepted as part of the *Sherbrooke Animal Welfare Local Law 1991* (Staindl 1993). The community and council support for the measures proposed in the Kangaroo Island plan reinforces the importance of engaging the whole community. The aims of the plan range from promoting responsible pet ownership to protecting native fauna and the island's economy (Kangaroo Island Council 2005).

Surveys conducted in both Perth and Magnetic Island have shown reasonable support for cat confinement from non-owners of cats, with approval ratings of 87% and 76% respectively. However, cat owners gave lower approval ratings for confinement, 48% for Perth and 38% for Magnetic Island (Grayson *et al.* 2002; Murray and Penridge 1997). Grayson *et al.* (2002) argues that animal welfare is the key to introducing measures such as cat confinement and that education should target cat owners.

Arguments against cat confinement include potential difficulties with compliance and enforcement (ACT Government 1998; Kelly 1999) and community concerns that confinement is cruel and unnatural (see Paton 1993; McMurray 2005).

However, potential benefits of cat confinement to both cats and the community have been reported including the reduced risks of cats straying, reduced community nuisance and less exposure to disease, road injuries and cat fights (Rochlitz 2000). Several veterinary animal behaviour specialists view confinement as an acceptable and often the only effective way of stopping individual domestic cats from hunting (Holmes 1993; Landsberg *et al.* 1997; Overall 1997; Calnon 2001). Overall (1997) reports that indoor cats, on average, live longer and healthier lives.

The Victorian Bureau of Animal Welfare, together with Petcare, are addressing community concerns by funding research on the welfare implications of cat confinement. The research will investigate stress and activity levels in confined cats and attitudes of cat owners to confinement (Jongman 2005). The Victorian Community Program on Responsible Pet Ownership is designing a D.I.Y. cat enclosure information booklet to help address concerns about the cost of cat enclosures (Van de Kuyt 2005).

#### **Night curfews**

While night curfews are likely to decrease domestic cat predation of mammals, they will not protect diurnal bird and reptile species (that is, species active during daylight hours) (Barratt 1997; Paton 1993). A Canberra survey of prey brought home by domestic cats found that 62% of mammalian prey was caught at night, while the majority of birds (70%) and reptiles (90%) were caught during the day (Barratt 1987: 271). A survey of injured animals brought to Sherbrooke wildlife shelters following the introduction of night curfews found that the proportion of possums suffering cat-related injuries fell. However, the proportion of native birds injured by cats increased from 30% to 53% (Pergl 1994, 4 of 6).

Turner and Meister (1988) state that modern domestic cats have shifted more of their activities, including predation, into the daylight hours compared to their wild ancestors. This view is supported by a study of the predatory behaviour of 3 domestic cats over a period of 4 years in a rural area in the US, which demonstrated that approximately 50% of prey was taken during daylight hours, 20% at dawn or dusk, and 30% at night (George 1974: 389).

#### **Desexing and identification of owned cats**

Desexing and identification of domestic cats are generally viewed as key components to promoting responsible pet ownership, reducing the numbers of stray cats and preventing supplementation of the feral pool (Copley 1991; Paton 1993; Carter 1994; Webb 1995; Kelly 1995,1999). The Kangaroo Island *Dog and Cat Management Plan 2005* emphasises the importance of feral cat control on the island and recommends mandatory identification, registration and desexing (see Box 3) (Kangaroo Island Council 2005).

However, the issue of whether desexing and identification should be mandatory has been contentious (see Kelly 1999) and has resulted in a variety of approaches being taken by local, State and Territory governments (see Appendix 1). The Cat Crisis Coalition (an alliance of Victorian animal welfare groups) is currently campaigning for mandatory desexing of cats to help address the large numbers of unwanted cats euthanased annually in Victorian animal welfare shelters (Cat Crisis Coalition 2005).

#### **Cat bans**

Cat bans involve legislation which prohibits the ownership of cats in specific areas. Cat bans have been established in a new residential area in Victoria and also in NSW (see Box 4).

#### **Box 4: Establishment of cat free zones in Victoria and NSW**

##### **The Waterways Estate, Victoria**

A cat free zone has been successfully established in a new residential area, "The Waterways Estate", in Victoria (Buttriss 2001). The Waterways Estate involves plans for the construction of 46 hectares of wetlands and is adjacent to Braeside Park, an important conservation reserve. As acknowledged by the council involved, it is preferable to have a cat ban brought in prior to occupation, rather than trying to alter the views of people who are already living in an established residential area. The cat ban was chosen over night curfews and confinement to the owner's property as it was a more effective means of eliminating domestic cat predation, and was perceived as cheaper and easier to enforce (Buttriss 2001).

##### **"Moringal" and "Mt Campbell", NSW**

Cat bans have also been provided for in two new rural residential subdivisions in the Yarrowlumla Shire in New South Wales, "Moringal" and "Mount Campbell" (ACT Working Party 2003). The cat bans are provided by either a community management statement under the Community Land Management Act 1989 or by a restrictive covenant applied to the lease using a section 88B instrument under the Conveyancing Act 1919. As with the provisions for cat confinement at "Little Burra", compliance appears to rely mainly on self-regulation and community peer pressure.

While cat bans may eliminate cat predation and are relatively easy to enforce, they have two major disadvantages. First, cat bans have a low public approval rating. A Perth survey has demonstrated that cat free zones are a contentious issue which should be approached with caution by local government (Grayson *et al.* 2002). There was less than 50% approval for the proposal that "the council should have the power to establish cat free zones in new subdivisions" (Grayson *et al.* 2002: 541). Those opposing the ban included both cat owners and non-owners. The authors suggested that such legislation may have been perceived as infringing civil liberties.

Second, cat bans fail to allow for the established benefits of cat ownership, for example improved physical and mental health (Anderson *et al.* 1992; McHarg *et al.* 1995), companionship (McHarg *et al.* 1995) and teaching children responsibility and compassion (Murray and Penridge 1997). Such benefits have been acknowledged by many involved in the debate over cat control (Fitzgerald 1990; Jarvis 1990, Paton 1993; Nattrass 1992; Fougere 2000). For example, Paton (1993) argues that cat confinement is a better option to cat bans. He suggests that cats have "an immense value as companion animals in human society" and that the question should not be about "whether or not to keep cats but how to keep them" (Paton 1993: 13). An Australian survey has found that cat owners represent 25% of households in metropolitan areas (REARK Research 1994).

##### **Belling cats**

Studies on the effects of belling cats have shown conflicting results. A recent experimental study showed a 50% reduction in prey brought home by cats wearing bells (Ruxton *et al.* 2002). However, two earlier studies have shown that bell-wearing has no effect (Paton 1991; Barratt 1998). The results of the experimental study should be interpreted with caution, as the authors acknowledge that a longer trial period could result in cats adapting their hunting behaviour to reduce the bell effects (Ruxton *et al.* 2002). It is clear that belling cats is an inadequate cat control measure for peri-urban reserves as it still allows some predation to occur, and is of unproven efficacy particularly over longer time periods.

## Conclusion

The literature demonstrates increased interest by local government and the community in protecting environmentally sensitive areas from domestic cat impacts. There is growing recognition that undisturbed habitat adjacent to new residential developments is at highest risk from domestic cat predation.

Cat confinement, although controversial in terms of cat owner opinion, appears to be the method of choice to prevent domestic cat impacts in peri-urban reserves. It can eliminate predation, unlike night curfews and belling, and unlike cat bans it allows for the well-recognised benefits of pet ownership. Cat confinement also provides public health benefits in terms of toxoplasmosis control and, together with desexing and identification, helps prevent the supplementation of feral cat populations.

Clearly, cat confinement strategies need to be part of an integrated approach to cat control. They also need to be underpinned by community education about the cat welfare benefits of confinement as well as the broader benefits to the community.

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## Appendix 1: Comparison of various local and State government cat management strategies

Issue	ACT Domestic Animals Act 2000	NSW Companion Animals Act 1998	South Australia Dog and Cat Management Act 1995	Victoria Domestic (Feral and Nuisance) Animals Act 1994	Sherbrooke (Vic) Animal Welfare Local Law 1991*	Magnetic Island (Qld) Local Law (now lapsed)
Desexing	<ul style="list-style-type: none"> <li>Compulsory</li> </ul>	<ul style="list-style-type: none"> <li>Not compulsory</li> <li>Encouraged</li> </ul>	<ul style="list-style-type: none"> <li>Not compulsory</li> <li>Encouraged</li> </ul>	<ul style="list-style-type: none"> <li>Not compulsory</li> <li>Encouraged</li> </ul>	<ul style="list-style-type: none"> <li>Not compulsory</li> <li>Encouraged</li> </ul>	<ul style="list-style-type: none"> <li>Compulsory</li> </ul>
Curfew	<ul style="list-style-type: none"> <li>Can be declared in a specified area of a suburb if there is a serious nature conservation threat</li> <li>Type of curfew is designated by the Minister</li> </ul>	<ul style="list-style-type: none"> <li>Encouraged</li> <li>Specific restrictions may be applied subject to a nuisance order</li> </ul>	<ul style="list-style-type: none"> <li>No curfews</li> <li>(Councils can enact by-laws for curfews)</li> </ul>	<ul style="list-style-type: none"> <li>Councils may make orders for cat confinement for specified hours</li> <li>Restricted from private property if owner objects</li> </ul>	<ul style="list-style-type: none"> <li>Night curfew</li> </ul>	<ul style="list-style-type: none"> <li>Encouraged</li> </ul>
Registration and identification	<ul style="list-style-type: none"> <li>Compulsory identification (microchip, collar and tag or tattoo)</li> <li>Registration not compulsory</li> </ul>	<ul style="list-style-type: none"> <li>Compulsory identification by microchip and lifetime registration</li> </ul>	<ul style="list-style-type: none"> <li>Not compulsory</li> <li>Encouraged</li> <li>(Councils can enact by-laws for compulsory identification)</li> </ul>	<ul style="list-style-type: none"> <li>Compulsory registration and identification</li> <li>Identification marker issued by council must be worn when outside their owners property</li> </ul>	<ul style="list-style-type: none"> <li>Compulsory registration and identification</li> </ul>	<ul style="list-style-type: none"> <li>Identification compulsory by microchip</li> </ul>

\* superseded by the *Animal Control Local Law 1996* (following amalgamation of Sherbrooke into the Yarra Ranges Shire Council). Night curfews still apply.

Adapted from Penson 1995; Scriggins and Murray 1997; Hayward, Animal Welfare Advisory Committee (ACT) 1998 (unpublished).

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