ACTION PLAN No. 23

Second Edition

The Smoky Mouse *Pseudomys fumeus* was declared an endangered species on 6 January 1998 (Determination DI1998-7, DI1998-192) in accordance with section 38 of the *Nature Conservation Act 1980*. Section 40 of the Act requires the Conservator of Flora and Fauna to prepare an Action Plan in response to each declaration. This is the Action Plan for the:

Smoky Mouse
Pseudomys fumeus

Preamble

The *Nature Conservation Act 1980* establishes the ACT Flora and Fauna Committee with responsibilities for assessing the conservation status of ACT flora and fauna and the ecological significance of potentially threatening processes. Where the Committee believes that a species or ecological community is threatened with extinction or a process is an ecological threat, it is required to advise the responsible Minister and recommend that a declaration be made accordingly.

Flora and Fauna Committee assessments are made on nature conservation grounds only and in a regional context. They are guided by criteria set out in its publication *Threatened Species and Communities in the ACT: criteria for assessment, July 2008*.

In making its assessment of the Smoky Mouse, the Committee concluded that it satisfied the criteria indicated in Table 1. Accordingly, in 1998, the Committee recommended the Smoky Mouse be declared Endangered. This replaces earlier declarations for the species.

An Action Plan is required in response to each declaration. The Action Plan must include proposals for the identification, protection and survival of a threatened species or ecological community, or, in the case of a threatening process, proposals to minimise its effect. While the legal authority of this Action Plan is confined to the Australian Capital Territory, management considerations are addressed in a regional context.

The first edition of this action plan was prepared in 1999 (ACT Government 1999). The first edition is superseded by this second edition in 2013.

The status of the Smoky Mouse in the ACT remains unchanged since the first edition of this Action Plan. The species is known from the ACT from two capture records and a probable hair sample, all obtained prior to 1994. Subsequent surveys have not detected the species and its continued presence in the ACT is uncertain.

Table 1 Criteria satisfied

1.2	Species is observed, estimated, inferred or suspected to be at risk of premature extinction in the ACT region in the near future, as demonstrated by one or more of:
	1.2.6 Extremely small population.

Conservation status

The Smoky Mouse *Pseudomys fumeus* is recognised as a threatened species in the following sources:

International
Endangered. IUCN Red List of Threatened Species.

National
Endangered. *Environment Protection and Biodiversity Conservation Act 1999*.

New South Wales
Critically Endangered. *Threatened Species Conservation Act 1995*.

Victoria
Critically Endangered. *Flora and Fauna Guarantee Act 1988.*

Australian Capital Territory
Endangered. *Nature Conservation Act 1980*.
Special Protection Status Species. *Nature Conservation Act 198*0.

Species description and ecology

DESCRIPTION

The Smoky Mouse was first described by Brazenor (1934) from animals collected in the Otway Range of southern Victoria. The Smoky Mouse is a native mouse, similar in size to a small rat (Watts and Aslin 1981) (Figure 1). It is pale grey to blue-grey to black above, with a grey to white belly (Cockburn 1995) and a ring of dark hairs around each of its large, bulging eyes (Mayo pers. comm.). The feet are pink with white fur (Cockburn 1995). The species is distinguished by its bicoloured tail, which is blue-grey dorsally, white ventrally and lightly furred (Mayo pers. comm.). The species has a head and body length of 85-100 mm (average 90 mm), a tail length of 110-145 mm (average 140 mm) and weighs between 45-86 g (Cockburn 1995).

Variability in size and colour has been noted between two forms found in Victoria. The western form, known only from the Grampians, is larger and darker than the eastern form (east of Melbourne) (Cockburn 1995). It appears that the specimens found in NSW are similar to the eastern form and a male trapped in the Brindabella Ranges had a pink scrotum (Osborne and Preece 1986), whereas those from the Grampians were darkly pigmented (Cockburn pers. comm.).

Figure 1: Smoky Mouse. Black and white illustration is approximately half actual size of the mouse.

HABITAT

The Smoky Mouse uses a range of vegetation communities as habitat including coastal and subalpine heath, Snow Gum (*Eucalyptus pauciflora*) woodland in the subalpine regions and dry forest dominated by eucalypts such as Broad-leaved Peppermint *E. dives*, Brittle Gum *E. mannifera*, Mountain Gum *E. dalrympleana* or Alpine Ash *E. delegatensis*. The species has also been trapped in fern gullies in wet forest in the Grampians (Menkhorst 1995). Surveys undertaken in eastern Victoria and south-eastern NSW (e.g. Menkhorst and Seebeck 1981; Jurskis et al. 1997; Ford 1998a, Ford 1998b; Ford et al. 2003) indicate that the species' preferred habitat is ridge-top sclerophyll forest (Cockburn 1995) with a diverse understorey of heathy shrubs.

A characteristic of Smoky Mouse habitat (with the exception of wet gullies) is the presence of floristically diverse heath or heathy understorey with members of the plant families Epacridaceae, Fabaceae and Mimosaceae well represented (Menkhorst & Seebeck 1981; Cockburn 1981a; Jurskis et al. 1997; Ford 1998a, Ford 1998 b; Ford et al. 2003). Adequate ground cover (low heath, grass tussocks, logs, rocks or leaf-litter) and soil conditions conducive to growth of hypogeal fungi (a major component of the diet) are also likely to be critical habitat elements (Menkhorst and Broome 2008).

DISTRIBUTION

Subfossil deposits indicate that the Smoky Mouse was once widespread in south-eastern NSW, reaching as far north as Jenolan Caves (Menkhorst & Seebeck 1981). Subfossil collections held at the CSIRO Australian National Wildlife Collection include abundant specimens of the Smoky Mouse collected from surface layers of caves from all karst areas in the ACT region including Yarrangobilly, Marble Arch, London Bridge (near Googong), Wombeyan, Wee Jasper, Michelago and Cooleman Caves (F. Ford pers. comm. 2012, Australian National Wildlife Collection Database). Subfossil deposits of the species have also been found in parts of eastern and western Victoria, including the Buchan district, the Grampians and near Nelson (Lee 1995).

Records of the Smoky Mouse from Victoria indicate that the species occurs mainly as widespread but disjunct populations in the Grampians, coastal slopes of the Otway Ranges, Eastern Highlands, Barry Mountains, near Mt Cobberas and coastal east Gippsland

between Marlo and Tamboon Inlet (Menkhorst & Seebeck 1981; Lee 1995; Menkhorst 1995). The species has been recorded from predator scats in the highland areas near West Buffalo and Mt Cobbler (Jones pers. comm.) and Mt Stradbroke (Belcher 1995). One individual was found near Toombullup (January 1998), and possible records from hair-tube surveys were obtained from Mt Beauty in north-eastern Victoria (April 1998) (Newell pers. com.). The most recent records of the species from the Grampians (Mt William) and the Victorian Central Highlands (Mt Terrible) are from 2008, during surveys using Elliot traps, hair-tubes and remote cameras (Nelson et al. 2009). Surveys in 2010 using hair tubes and remote cameras detected the species in the Big River Catchment (between Enoch Point and Woods Point) in north east Victoria (Nelson et al. 2010). Surveys in coastal Gippsland (between Marlo and Bemm River) in 2010 using hair tubes and remote cameras failed to detect the species (Nelson et al. 2010).

In NSW evidence for the species was found from hair sampling tubes in 1993 at Mt Poole in Nungatta State Forest in the Eden district of south-eastern NSW (Menkhorst and Broome 2008). In 1994 a NSW State Forests research team trapping for potoroos in Nullica State Forest caught the first Smoky Mouse to be trapped in NSW (Jurskis et al. 1997). The site is now included in South East Forests National Park (Nullica Section). The species has subsequently been recorded at 21 sites from a small area of Nullica State Forest and the adjoining South East Forests National Park (the Smoky Mouse Species Management Planning Area). Thirty known or potential habitat sites in the planning area are currently monitored each year with the most recent records from 2011 (L. Broome pers comm. June 2012; OEH and FNSW unpubl. data).

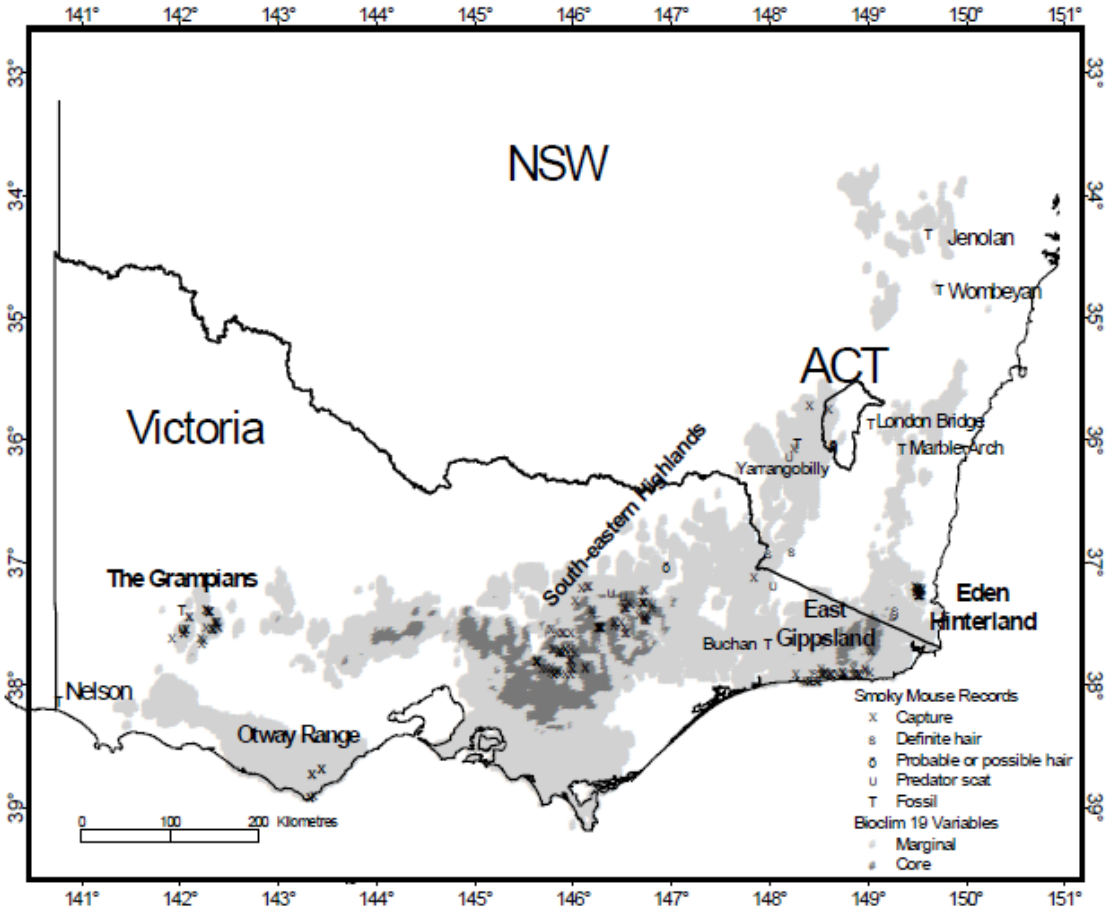

Figure 2. Distribution of the Smoky Mouse showing location records and a predicted distribution using the BIOCLIM climatic model. Map from Menkhorst and Broome (2008).

In Kosciuszko National Park (KNP) hair-tube records were obtained from the Pilot and Ravine areas, and three individuals were found dead near the Yarrangobilly Caves in October 1998 (Ford 1998a; Ford 1998b). The species has also been recorded from the adjacent Ingebyra State Forest (one hair record) and Buccleugh State Forest (Menkhorst and Broome 2008). The most recent record from the South East Highlands is from Alpine National Park in 2007.

In the ACT, two males have been trapped in the Brindabella Ranges in Namadgi National Park, one from near Bulls Head in 1985 (Osborne and Preece 1986) and one from Mt Kelly in 1987 (Mayo 1987). In 1994 a probable Smoky Mouse hair sample was identified from a bird nest collected from Mt Namadgi (ACT) and another possible Smoky Mouse hair sample was obtained from a hair sampling tube in the vicinity. There is also an unconfirmed report of an individual trapped near Mt Coree in the 1970s (T. Macdonald pers. com. 1998). Trapping and hair-tube surveys since this time have failed to detect the species in the ACT. However, the more recent records from nearby NSW (Buccleugh State Forest and Yarrangobilly Caves in KNP, which are located 17 km and 33 km respectively from the ACT border) suggest that the species may still occur in the ACT and region, though probably at low densities.

The distribution of records in subfossil remains indicates that the species' range was once more widespread than that reflected from recent records. Bioclimatic modelling using all available capture, definite hair-tube and hair-in-predator-scat records suggests the Smoky Mouse could, given suitable habitat, occur more widely, particularly in southern Victoria. The modelling also supports the locations of the sub-fossil records (which were not included in the model) (Menkhorst and Broome 2008). The location of Smoky Mouse records and a predicted distribution using the BIOCLIM climatic model is shown in Figure 2.

Lee (1995) notes that the species probably declined prior to European settlement. However, the presence of Smoky Mouse sub-fossil deposits on the surface layers of all karst areas in the South-eastern highlands in association with radiocarbon dated bones that are less than 200 years old (e.g. Aplin et al. 2011) indicates the decline in the species range occurred after European settlement (F. Ford pers. comm. 2012). The current distribution of the Smoky Mouse is relictual and extremely difficult to interpret, thus it is not possible to identify any particular cause precipitating the declines (Cockburn pers. comm.).

BEHAVIOUR AND BIOLOGY

Studies undertaken on the summit of Mt William in the Grampians indicate that the Smoky Mouse relies on three very distinct food sources, all of which are rich in nitrogen (Cockburn 1981a). The Smoky Mouse forages for legume seeds and epacrid berries, as well as Bogong Moths during summer. A study of the population in the Nullica State Forest near Eden found habitat preference to be directly related to a dietary preference for legume seed and epacrid fruits during summer months (Ford 1998a). In winter and early spring, when few seeds are produced from the shrubs, the species switches to hypogeous (underground) truffle-like fungi that are common around the roots of certain shrubs and grasses (Cockburn 1995, Ford 1998a; Ford et al. 2003). This behaviour suggests the Smoky Mouse may be more dependent on the fruiting bodies of hypogeal fungi than are other Pseudomys species (Ford et al. 2003).

This reliance on seasonal food sources creates a nutritional crisis for the Smoky Mouse during late spring and early summer. The fruiting bodies of the hypogeous fungi disappear due to loss of soil moisture at a time when there are few alternative sources available until the mid-summer plant productivity flush (Cockburn 1995). Thus, the species can survive during this period only in restricted habitats where Bogong Moths are attracted to spring blossoms and new seeds are set (Cockburn 1995). However, studies on the Nullica population (Ford 1998a; Ford et al. 2003) indicate that population decline does not appear to be linked with fungal decline, which suggests that social factors or predation could be involved.

POPULATION DYNAMICS

The species occurs in small, discrete colonies that tend to be ephemeral, both spatially and temporally. Colonies often comprise a male and several females, typically inhabiting a burrow system in dense heath (Woods & Ford 2000; Ford et al. 2003).

Smoky Mouse populations are subject to large annual fluctuations in abundance (Cockburn 1981b; Ford 1998a). Cockburn (1981b) attributes this to the decline in available food sources during late spring whereas Ford (1998a) indicates that the causes are unclear,

but suggests that males may decline due to social conflict. Other possible factors include predation and low availability of food resources due to low rainfall in previous months (Ford et al. 2003). Fluctuations for females are not so large because they tend to be more selective in their habitat choice and occur in higher densities in the preferred habitat which offers protection during the late spring nutritional crisis. Individuals with home ranges outside these favoured sites (more males than females) generally do not survive, although it has been suggested that they may perform an important exploratory role in colonising new areas (Cockburn 1981b).

Establishment of breeding territories occurs in August or September, followed by breeding from September to April. Females produce one to two litters, each with three to four young, following a gestation period of about 30 days. Females may cohabit breeding burrows and a high degree of breeding synchrony has been observed within nests (Ford 1998a, 1998b; Woods & Ford 2000). In good quality habitat the females often live to breed in the second year with older females breeding slightly earlier than the younger animals (Cockburn 1995). Survivorship of juveniles and adults appears to be low in all but the best quality habitat (Cockburn 1981b, Ford 1998b).

Cockburn (1995) notes that the preferred habitat for this species (which is characterised by a diverse understorey of heathy shrubs, especially legumes) is fire-generated, and suggests that the species is dependent upon post-fire succession for survival. However, the possible disappearance of the species from its former stronghold in heathy vegetation in the Grampians does not appear to be associated with visible vegetation change, or with the disappearance or decline of any vascular plant species (Cockburn pers. comm.). It is possible that unobserved changes have occurred in the ecology of the hypogeous fungi, which form an important part of the species' diet (Cockburn pers. comm.).

The species appears to be typical of members of the genus Pseudomys, which generally occur at low population densities until resource availability allows a rapid and brief increase in numbers, after which numbers again fall to low densities (Watts & Aslin 1981; Dickman et al. 1999). However, site persistence for the Smoky Mouse appears to be extremely low (Menkhorst and Broome 2008) and thus recruitment of locally extinct sites will depend on habitat patches that are well connected.

Threats

Since European settlement throughout the range of the Smoky Mouse, several major environmental changes have occurred that are likely to have seriously disadvantaged the species. These are (Lee 1995; Menkhorst and Broome 2008):

- **Vegetation clearance**, resulting in loss and fragmentation of habitat and likely contraction of range. Habitat loss in some areas could also result from dieback of susceptible heath species caused by the fungus *Phytophthora cinnamomi*.

- **Inappropriate fire regimes**, resulting in changes to the floristic composition and structure of ground and shrub vegetation, which could have deleterious effects on food sources and increase susceptibility to predation.

- **Predation** by the introduced European Red Fox (*Vulpes vulpes*) and cat (*Felis catus*), which could be significant for small isolated populations, and for communal nesting species such as the Smoky Mouse (Ford 1998a).

Smoky Mouse populations (colonies) fit the metapopulation model, whereby populations are largely isolated from one another and re-establishment of a locally extirpated population depends on immigration from other populations. The discrete and ephemeral nature of Smoky Mouse colonies, together with their apparent low persistence at sites, means that Smoky Mouse populations are likely to be profoundly affected by habitat fragmentation (loss of connectivity between habitat patches), which reduces the species' ability to disperse, to recolonise habitat patches, and probably to maintain genetic diversity (Saunders et al. 1991; Fahrig and Merriam 1994).

Heath communities are strongly influenced by time since fire and fire frequency, which affect floristic composition and structure. Frequent fires (such as prescribed fuel-reduction burns) favour early vegetation succession characteristics and tend to reduce species diversity and structure, whereas very infrequent fires can lead to senescing of heath and a higher likelihood of large-scale, severe wildfire (Catling 1986, 1991). Frequent fire may also reduce abundance and diversity of hypogeal fungi, which prefer well developed litter layers (Claridge & Cork 1997; Menkhorst and Broome 2008).

The species has been trapped in vegetation ranging from early to senescent seral stages following fire (2-40 years) (Menkhorst and Broome 2008), though information is lacking on an optimal fire regime for the Smoky Mouse. Frequent fire may remove ground cover (bushes and hollow logs) that act as predator refuge for the species, whereas severe fire in late-succession or senescent heath could eliminate colonies (Menkhorst and Broome 2008). In heath and dry forest, fire regimes of moderate frequency (15–20 but up to 40 year intervals) and low to moderate severity are probably the most appropriate for maintaining suitable habitat (understorey structure and floristics) at most Smoky Mouse sites (Lane 1997; Ford et al. 2003; Menkhorst and Broome 2008).

Current climate change predictions suggest that wildfires will become more frequent and will be more severe. Whether such 'unplanned' fire regimes *per se* will be unfavourable for the Smoky Mouse and its habitat is uncertain. However, the effect of higher-severity wildfire events could result in a greater probability of local extinctions of Smoky Mouse populations. More frequent fuel reduction burns (in response to perceived greater fire threat) could also present a threat to the Smoky Mouse if the resulting fire regime promotes habitat characteristics that are less suitable for the species.

In addition to altered fire regimes, climate change is expected to result in warmer temperatures and less rainfall (IPCC 2007) and a consequent shift in the distribution of most vegetation communities towards the south and towards higher elevations. It is possible that under such conditions the distribution of cool, montane vegetation communities of the higher elevation areas of Australia will contract, resulting in less of this type of habitat available for the Smoky Mouse. It is uncertain whether such conditions will cause a contraction or expansion of dry heath communities (such as those on rocky ridge-tops), which are also used by the Smoky Mouse.

The Smoky Mouse is particularly vulnerable to predation because it has a relatively low reproductive rate, often inhabits vegetation with an open ground layer, and uses communal burrows with well-defined entrances that can be staked out by 'sit and wait' predators (such as feral cats) (Menkhorst and Broome 2008). The three Smoky Mouse individuals found dead at Yarrangobilly in 1998 was most likely the result of cat predation (Ford 1998b). Control programs targeting only foxes need to consider the risk of a consequent increase in rabbits and cats (Risby et al. 2000), both of which have the potential to impact Smoky Mouse populations.

The effects of habitat loss and fragmentation, wildfires, inappropriate fire regimes and predation are all likely to act synergistically to limit populations to small, isolated, fire and predator refuges within the species' preferred heathy habitat.

In the ACT, all known habitat for the species is formally protected within Namadgi National Park. Currently, the main threats to the species in the ACT are likely to be inappropriate fire regimes and predation by the European Red Fox and cat. Climate change can be speculated to have some future impact on the Smoky Mouse in terms of altered fire regimes and possibly reduced habitat area.

Major conservation objective

The objective of this Action Plan is to maintain in the long term, viable, wild populations of the Smoky Mouse as a component of the indigenous biodiversity of the ACT and region.

The objective is to be achieved through the following strategies:

Survey and Monitoring

Undertake a program of survey and monitoring aimed at better understanding the abundance and distribution of the species in the ACT.

Research

Promote and participate in a program of research aimed at better understanding the ecology of the species, including habitat preference and causes of population decline.

Protection and Management

Identify, protect and manage habitat critical to survival of the species in the ACT, and manage threats to the recovery of the species.

Conservation issues and intended management actions

SURVEY AND MONITORING

Following the two sightings of the Smoky Mouse in Namadgi National Park (NNP) in 1986 and 1987, intensive small mammal trapping efforts were undertaken at the two

localities (Lawrence 1986; Lintermans 1988). However, no additional captures of the species were made. In the 1993-94 summer an intensive survey using hair-sampling tubes was undertaken within predicted habitat areas in Namadgi and Kosciuszko National Parks. From 1,354 tubes placed by the ACT Parks and Conservation Service in NNP, only one probable hair sample (from hair in a bird's nest) of the Smoky Mouse was obtained at Mt Namadgi (in addition to one possible hair sample obtained from a hair tube at the same site).

Within the ACT region, surveys for the Smoky Mouse have been undertaken in Kosciuszko National Park, Ingebyra State Forest and Buccleugh State Forest (Menkhorst and Broome 2008). A single hair sample was obtained from a survey in KNP comprising 1,490 hair tubes in 1994-95. Another hair sample was found in October 1996 from a Quoll scat at Ravine, at the northern end of KNP. However, there have been no reports of positive identifications from hair analyses from numerous scats collected in various places throughout the park (Mayo pers. comm.). Subsequent trapping surveys in the Ravine area were unsuccessful but three individuals were found dead at Yarrangobilly in 1998 (Ford 1998b).

Due to apparent late spring die-offs (Cockburn 1981b; Ford 1998a), the optimal times for surveying adults is from late August to late September in the coastal forests and from September to November in the sub-alpine areas. However, the species can also be readily detected from February to May, when juveniles are recruited into the populations.

Objectives

1. Extant populations of the Smoky Mouse in the ACT are identified.
2. The persistence time of identified extant populations of the Smoky Mouse in the ACT is known.
3. All evidence of the presence of the Smoky Mouse within Namadgi National Park or neighbouring areas, including incidental observations, is recorded and collated.

Actions

1. Undertake survey for the species in likely habitat in the ACT, including sites where the species has been previously recorded.
2. Known extant Smoky Mouse populations are monitored annually for two more years following their discovery. Populations that persist after the two year monitoring period continue to be monitored every three years (until they are not detected).
3. All evidence of the species is recorded and collated in a suitable database. Reliable evidence will be followed up though site visits and surveys will be undertaken of likely extant populations.

Indicators

1. An extensive survey for the Smoky Mouse in the ACT is undertaken.
2. The monitoring program for known extant populations is undertaken.
3. All evidence of the presence of the Smoky Mouse in the ACT or neighbouring areas is recorded in a suitable database. Reliable recent sightings are followed up and likely extant populations are surveyed.

RESEARCH

Menkhorst and Broome (2008) identify the need for further research on the species' distribution and abundance, habitat preferences, genetic differences and the effect of fire regimes on habitat. Ford (1998a) undertook a detailed study on the ecology and social organisation of the population in south-eastern NSW to determine whether Cockburn's findings can be generalised across the range of the species. There are currently too few records of the species from the ACT to confirm whether habitat of the Smoky Mouse in the ACT is the same as other parts of its range. Because Smoky Mouse habitat (heath communities) is strongly influenced by time since fire and fire regime, monitoring of vegetation following fire will assist in better understanding the effect of fire and succession on habitat characteristics.

Climate change could result in a change in the distribution and availability of suitable Smoky Mouse habitat. Vegetation distribution modelling (using Bioclim or similar) under likely climate change scenarios may assist in predicting the future availability and distribution of Smoky Mouse habitat in the ACT region.

The difficulty of detecting the species, the apparently ephemeral persistence of populations and the likely small number of individuals in any extant population in the ACT pose significant challenges for undertaking research on individuals or populations of the species. Achieving the following objectives will depend largely on whether extant populations of the Smoky Mouse are detected in the ACT.

Objectives

1. An improved understanding of the ecology of the Smoky Mouse is gained and used to identify and manage causes of population decline.
2. The key habitat characteristics of the Smoky Mouse in the ACT are known and potential habitat (vegetation type) is mapped for the ACT.
3. Predicted habitat areas are also mapped under likely climate change scenarios.

Actions

1. Participate in and support research by tertiary institutions to better understand the ecology and threats to Smoky Mouse populations, including habitat preferences, genetic differences, the effect of fire regimes on habitat, and predation risk.
2. Habitat characteristics (including fire regime and vegetation response to fire) are recorded for known extant populations and all reliable records of the Smoky Mouse in the ACT. These characteristics are used to develop a habitat model and the habitat vegetation type is mapped for the ACT from available vegetation maps and expert knowledge.
3. If sufficient information is available, use vegetation modelling under climate change scenarios to predict future habitat areas.

Indicators

1. There is an improved understanding of the ecology of the Smoky Mouse, and this information is used to inform conservation actions to protect the species.
2. Habitat characteristics for locations of extant populations and any reliable evidence of the presence of the species have been recorded. The species preferred vegetation type has been mapped for the ACT, if sufficient information is available.
3. Predicted habitat areas under climate change scenarios have been mapped, if sufficient information is available.

PROTECTION AND MANAGEMENT

All currently known habitat areas for the Smoky Mouse in the ACT occur in Namadgi National Park, and hence are formally protected. To avoid loss and fragmentation of Smoky Mouse habitat within the park, no new vehicle access tracks or other infrastructure should be constructed within key habitat (where the species has been recorded, or where there is a strong likelihood of the species occurring based on preferred habitat and proximity of past records).

Foxes, cats and other predators are known to use vehicle and walking tracks. Given the species' susceptibility to predation, no new walking tracks should be constructed within or near key Smoky Mouse habitat. Control of foxes, feral pigs, and feral cats should be undertaken in the vicinity of any known extant populations of the Smoky Mouse. However, the use of poisoned grain (for pigs) must not be used in key Smoky Mouse habitat.

Management of Smoky Mouse habitat will involve management of fire interval and fire regime. Available information on the conservation requirements of the species (including regeneration of areas of heath following fire) should be incorporated into the appropriate bushfire management plans covering Namadgi National Park. This information will enable decisions to be made regarding planned and unplanned burns in Smoky Mouse habitat, including the management response to wildfires that are likely to burn Smoky Mouse habitat (such as heath or dry sclerophyll forest on ridges). In the event of such wildfires, liaison with the appropriate ACT or NSW bush fire suppression authority will help achieve a coordinated response to management and protection of Smoky Mouse habitat.

Objectives

1. Key habitat (where the species has been recorded or is highly likely to occur) for the Smoky Mouse in Namadgi National Park is protected from the impacts of new access tracks (vehicle and walking) and other infrastructure.
2. Smoky mouse habitat is protected from fire regimes that are likely to be detrimental to the species and from impacts of fire management and suppression activities.
3. Known populations of the Smoky Mouse and key habitat are protected from the impacts of feral animals and weeds.

Actions

1. Information, where available, on Smoky Mouse conservation requirements and locations of key habitat is provided to park managers to guide planning decisions on new vehicle and walking tracks and other infrastructure.
2. Include guidelines for fire management in Smoky Mouse habitat in Bushfire Operational Plans and other relevant fire planning/management documentation.
3. Manage feral animals and weeds so that their impacts do not threaten the viability of known extant populations or key habitat.

Indicators

1. New access tracks (vehicle or walking) or other infrastructure are not constructed in key Smoky Mouse habitat.
2. The frequency and severity of planned fires in Smoky Mouse habitat are compatible with an appropriate fire regime for the species.
3. Impacts from feral animals and weeds do not pose a threat to the viability of known Smoky Mouse populations or key habitat.

Legislative provisions

The following legislation applies to the conservation of flora and fauna in the ACT:

ACT LEGISLATION

Nature Conservation Act 1980

The Nature Conservation Act 1980 protects native plants and animals and the nests of native animals. It establishes the Conservator of Flora and Fauna and specified activities are controlled via a licensing system. The Conservator may give the occupier of land directions for the protection or conservation of native plants and animals on the land. The Act also provides authority for the management of public land that is reserved for conservation of the natural environment. Special measures for conservation of a species or community of concern can be introduced.

Planning and Development Act 2007

The object of this Act is to provide a planning and land system that contributes to the orderly and sustainable development of the ACT. The Act establishes the Territory Plan; provides for the identification, reservation and management of Public Land; and outlines requirements for environmental impact assessment.

Heritage Act 2004

This Act establishes a system for the recognition, registration and conservation of natural and cultural heritage places and objects. A list of these places is maintained on the ACT Heritage Register.

COMMONWEALTH LEGISLATION

Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is the primary Commonwealth legislation for environment protection. Under the EPBC Act, an action will require approval from the (Commonwealth) Environment Minister if the action has, will have, or is likely to have a significant impact on a matter of national environmental significance and it is not subject to certain specified exceptions. Matters of national environmental significance are: World Heritage and National Heritage properties, Ramsar wetlands of international importance, nationally listed threatened species and ecological communities, migratory species protected under international agreements, Commonwealth marine environment and nuclear actions.

The Smoky Mouse is listed as endangered under the EPBC Act.

Implementation and review

The ACT Government (Environment and Sustainable Development Directorate) has responsibility for coordinating implementation of this Action Plan. Some actions will involve collaboration between government agencies (within the ACT and between the ACT and NSW) and research organisations.

The Flora and Fauna Committee will review implementation of this Action Plan after three years. The review will comprise an assessment of achievement of the objectives of the Action Plan, recognising that the timeframe for achieving some objectives are necessarily longer than the duration of this Action Plan. Assessment of progress will be based on achieving the relevant indicator for each Action.

The review will provide an opportunity for both the Flora and Fauna Committee and relevant section(s) of the ACT Government to assess progress; take account of new knowledge of the species and threats; consider new developments in policy and administration; and review directions and priorities for future conservation actions.

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Personal communications, some originally cited in the first edition of this Action Plan, are from:

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C. Slade, ecologist, State Forests of NSW, who has undertaken surveys of Smoky Mouse.

The illustration of the species (Figure 1) was prepared for the ACT Government by Fiona Sivyer.

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List of Action Plans

In accordance with Section 23 of the *Nature Conservation Act 1980*, Action Plans are prepared by the Conservator of Flora and Fauna. The following are current:

No. 5: A subalpine herb (*Gentiana baeuerlenii*) —an endangered species.
No. 6: Corroboree Frog (*Pseudophryne corroboree*)—a vulnerable species.
No. 22: Brush-tailed Rock-wallaby (*Petrogale penicillata*)—an endangered species.
No. 23: Smoky Mouse (*Pseudomys fumeus*)—an endangered species.
No. 27: Woodlands for Wildlife. ACT Woodland Conservation Strategy.

Incorporating Action Plans for the following threatened species and communities:

- Yellow Box – Red Gum Grassy Woodland
- A Leek Orchid (*Prasophyllum petilum*)
- Small Purple Pea (*Swainsona recta*)
- Hooded Robin (*Melanodryas cucullata*)
- Swift Parrot (*Lathamus discolor*)
- Superb Parrot (*Polytelis swainsonii*)
- Brown Tree creeper (*Climacteris picumnus*)
- Painted Honeyeater (*Grantiella picta*)
- Regent Honeyeater (*Xanthomyza phrygia*)
- Varied Sitella (*Daphoenositta chrysoptera*)
- White-winged Triller (*Lalage sueurii*)

No. 28: A Vision of the Grassy Plains Extended. ACT Lowland Native Grassland Conservation Strategy.

Incorporating Action Plans for the following threatened species and communities:

- Natural Temperate Grassland
- Striped Legless Lizard (*Delma impar*)

- Grassland Earless Dragon (*Tympanocryptis pinguicolla*)
- Golden Sun Moth (*Synemon plana*)
- Perunga Grasshopper (*Perunga ochracea*)
- Button Wrinklewort (*Rutidosis leptorrhynchoides*)
- Ginninderra Peppercress (*Lepidium ginninderrense*)

No. 29: Ribbons of Life. ACT Aquatic Species and Riparian Zone Conservation Strategy.

Incorporating Action Plans for the following threatened species and communities:

- Two-spined Blackfish (*Gadopsis bispinosus*)
- Trout Cod (*Maccullochella macquariensis*)
- Macquarie Perch (*Macquaria australasica*)
- Murray River Crayfish (*Euastacus armatus*)
- Silver Perch (*Bidyanus bidyanus*)
- Tuggeranong Lignum (*Muehlenbeckia tuggeranong*)
- Pink-tailed Worm Lizard (*Aprasia parapulchella*)

No. 30: Spotted-tailed Quoll (Dasyurus maculatus) - a vulnerable species.
No. 31: Canberra Spider Orchid (*Caladenia actensis*)
No. 32: Brindabella Midge Orchid (*Corunastylis ectopa*)
No. 33: Glossy Black Cockatoo (*Calyptorhynchus lathami*)
No. 34: Murrumbidgee bossiaea (*Bossiaea grayi*) K. L. McDougall

FURTHER INFORMATION

Further information on this Action Plan or other threatened species and ecological communities can be obtained from:
Environment and Sustainable Development
ACT Government
Phone: (02) 132281
Website: http://www.environment.act.gov.au

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