

# Action Statement No. 254

Long-nosed Potoroo *Potorous tridactylus*  
Flora and Fauna Guarantee Act 1988



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Cover photo: Long-nosed Potoroo at Healesville Sanctuary (Peter Menkhorst)

## Long-nosed Potoroo *Potorous tridactylus*

### Description

The Long-nosed Potoroo (*Potorous tridactylus*) (Kerr 1972) is one of the smallest members of the kangaroo superfamily (the Macropodoidea) and one of 10 species in the Potoroidae family. Like all kangaroos they have well developed powerful hind limbs and long hind feet. Long-nosed Potoroos have grizzled grey-brown fur which is lighter below, a prominent snout and short, rounded ears. The tail is 180–250 mm long and is shorter than the head body length (340–400 mm) while the hind foot at 70–82 mm is shorter than the head length. Long-nosed Potoroos weigh between 660–1600 g (Claridge *et al.* 2007, Menkhorst and Knight 2010). In East Gippsland, Long-nosed Potoroos are partially sympatric with the similar Long-footed Potoroo, however the latter is larger, has more prominent ears, a longer thicker tail and a hind foot longer than the head.

The Long-nosed Potoroo (the generic common name is adapted from the Eora aboriginal name 'Poto-Roo') was the first macropod to be seen alive in Europe. A pair suffered reverse transportation from the new penal settlement of Sydney to London in 1789, where they were put on display (Claridge *et al.* 2007). This species was also the first of the Potoroidae family to be formally described by John Kerr in 1792.

### Distribution

Three subspecies of the Long-nosed Potoroo are now recognised; *P. tridactylus tridactylus* from Sydney north to south-eastern Queensland, *P. t. trisulcatus* in southern NSW and Victoria and *P. t. apicalis* on the Bass Strait islands and in Tasmania (Frankham *et al.* 2012).

At the time of listing on the *Flora and Fauna Guarantee Act 1988* (FFG Act), there were two recognised subspecies; *P. tridactylus tridactylus* and *P. tridactylus apicalis*. At that time, *P. t. tridactylus* was considered to be the only subspecies on mainland Australia, the FFG Act therefore lists *P. t. tridactylus*. The subsequent revision of the Long-nosed Potoroo's taxonomy does not affect its status under the FFG Act.



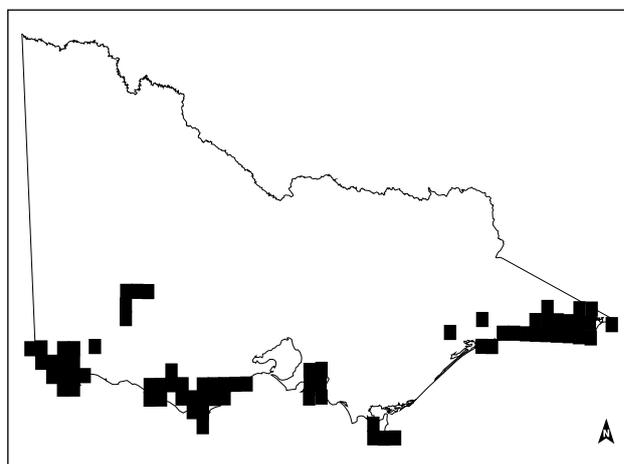
Long-nosed Potoroo (Graeme Coulson)

On the Australian mainland the Long-nosed Potoroo has a patchy distribution along the eastern and south-eastern seaboard from around Gladstone in south-eastern Queensland to Mt Gambier in the south-eastern corner of South Australia (van Dyck and Strahan 2008).

Throughout its range, nearly all recent records occur within about 50 km of the coastline, the exception being the Grampians population. In Victoria there are significant populations in East Gippsland (east of Lakes Entrance), Wilson's Promontory, French Island, the Otways, the lower Glenelg River area and the Grampians. These populations, which were probably relatively continuous before European settlement, are now isolated from one another. The East Gippsland population is the largest and is continuous along the coast, extending into south-eastern NSW (Menkhorst 1995). Department of Environment and Primary Industries (DEPI) has prepared a Species Distribution Model for the Long-nosed Potoroo (DEPI unpublished). The habitat it models largely reflects the current distribution but also suggests there is suitable (but apparently unoccupied) habitat in the Mullundung and Holey Plains area north-east of Yarram in South Gippsland, in the Western Port catchment and on the Mornington Peninsula.

### Habitat

The habitat of the Long-nosed Potoroo is characterised by dense vegetation in the ground and shrub layers. They use a range of floristic associations, apparently preferring a mosaic of open and closed patches (Bennett 1993, Ricciardello 2006). Most records are from heathy woodland, though they also occupy lowland and damp forest types and in the Otway Ranges there are records from wet forest to an altitude of about 650 m (Seebeck 1981, Seebeck *et al.* 1989). In northern NSW they occur in rainforest and wet forest as well as coastal vegetation (NSW Department of Environment and Heritage 2013).



Distribution in Victoria (Victorian Biodiversity Atlas DEPI 2013)

## Life history and ecology

Long-nosed Potoroos are mostly nocturnal but can also be active during the day. They shelter in a shallow squat in dense vegetation and do not build complex nests, though they are able to use their prehensile tail to carry light nesting material. Long-nosed Potoroos are generally solitary except when mating or when females have young-at-foot (Bennett 1993, Claridge *et al.* 2007). They mate promiscuously and breed throughout the year. A single young is born after a gestation period of about 38 days. The young spend about 120–130 days in the pouch and are weaned at about 170 days (Bryant 1989, Frankham *et al.* 2011). Long-nosed Potoroos exhibit embryonic diapause, by which they are able to carry a dormant embryo after a post-partum oestrus; the dormant embryo recommences development after the previous young vacates the pouch. Reproductive potential is about 2.5 young per year. Long-nosed Potoroos become sexually mature at about 12 months of age and can live for more than seven years, though four to five years is more common. Young males appear to disperse actively whereas young females tend to remain in or very close to their mother's home range (Claridge *et al.* 2007).

Long-nosed Potoroos are not territorial but occupy stable, overlapping home ranges. At Naringal in south-west Victoria and Cape Conran in East Gippsland these were quite small; 1–3 ha for females and to 2–4 ha for males (Bennett 1987, Ricciardello 2006). Home ranges were much larger at a site in southern Tasmania; 2–11 ha for females and 12–34 ha for males (Kitchener 1973). Measured population densities include 0.19 to 2.55/ha at Naringal (Bennett 1993), 0.18/ha for females and 0.32/ha for males in southern Tasmania (Kitchener 1973), 0.25/ha in northern NSW (Mason 1997) and 1.4/ha at Lake Tyers in East Gippsland (Gaborov 2012).

The diet of Long-nosed Potoroos is generally dominated by the sporocarps (truffles) of hypogeous fungi. They find these by scent and dig cylindrical pits to extract them. They also eat other fungi as well as insects, fruits and plant material (Bennett and Baxter 1989, Claridge *et al.* 1993, Tory *et al.* 1997). In excess of 50 species of fungi have been identified in the diet and the availability of sporocarps is likely to be a key influence on the distribution and abundance of the species. This association with hypogeous fungi highlights a role of the species as an 'ecosystem engineer'. The fungi are critical for the health of forest trees and the potoroos are part of a three-way relationship, dispersing the fungal spores through the forest (Claridge and May 1994, Claridge and Trappe 2004).

## Conservation status

### National conservation status

The Long-nosed Potoroo (*Potorous tridactylus tridactylus*) has been listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

### Victorian conservation status

The Long-nosed Potoroo (*Potorous tridactylus tridactylus*) has been listed as threatened under the *Flora and Fauna Guarantee Act 1988*.

Long-nosed Potoroo (*Potorous tridactylus tridactylus*) is listed as Near Threatened in Victoria according to the Advisory List of Threatened Vertebrate Fauna in Victoria 2013 (DSE 2013). Their status was revised from Endangered in the 2007 list (DSE 2007).

## Threats

The preferred habitat of the Long-nosed Potoroo was once widespread throughout southern Victoria. Clearing for agriculture and urbanisation (especially in coastal areas) reduced and fragmented this habitat so that the remaining subpopulations are now isolated from one another. Potoroo populations have been further affected by introduced predators and possibly also by changes to fire regimes since European settlement. Seebeck (1981) identified six discrete subpopulations in the early 1980s and, 30 years later, most still persist, though there has been some contraction in the Lakes Entrance area and the Otways and the species is no longer found on Phillip Island.

Long-nosed Potoroos belong to the group of Australian mammals known as 'critical weight range' species that suffer severely from predation by foxes and cats (Burbidge and McKenzie 1989, Johnson *et al.* 1989, Kinnear *et al.* 2002). Near Cape Conran in East Gippsland, the Long-nosed Potoroo population density increased by up to 7-fold over four years after the introduction of intensive fox control (Murray *et al.* 2006, Dexter and Murray 2009), although by 2013 the Cape Conran population had declined and is now only four times as large as the pre-baiting population (Andrew Murray pers. comm. 2013). In the Glenelg Ark project area of far south-west Victoria, Robley *et al.* (2011) also observed a significant response to fox control at one site, while Smith (2013), working in the same area, found Long-nosed Potoroos present at more sites and occupying a wider range of habitats in the presence of intensive fox control, compared to sites where there was no fox control.

Although Long-nosed Potoroos live in fire-prone habitats such as heathy woodlands, there is evidence to suggest that Long-nosed Potoroos are most abundant at sites that are relatively long unburnt. Catling *et al.* (2001) found that potoroo numbers were very low or absent immediately after fire and increased with time since last fire and with increasing structural complexity of the vegetation. Their modelling suggested that potoroos should be in high abundance by 25 years after a fire. Later modelling of the influence of fire in the same area indicated that Long-

nosed Potoroo numbers increased from 10 years after fire, concurrently with the closing tree canopy (Arthur *et al.* 2012). This relationship between increasing likelihood of detecting potoroos and increasing time since fire seems to hold across many sites in south-eastern Australia (Claridge and Barry 2000).

There also appears to be a relationship between fire and vulnerability to predators. Smith (2013) found Long-nosed Potoroos present across a wide range of fire histories where there is intensive fox control, but only at sites without fire for more than 30 years and without fox control. It is likely that large, unburnt patches of vegetation play an important role in survival immediately following a fire event, providing refuge for a population from predators until vegetation that provides cover from predators returns. Smith (2013) described high use of unburnt patches by Long-nosed Potoroos for up to 16 months near a planned burn. Predators are known to preferentially hunt along the boundary between burnt and unburnt patches. (Whelan *et al.* 2002).

Fire also influences the production of the potoroos's main food source, fungal sporocarps. Sporocarp production by some species can increase post-fire, providing increased food resources for potoroos (Johnson 1997), while fire may be detrimental to other species (Claridge and Trappe 2004). The role of fire in maintaining this important food source needs further investigation.

The impact of timber harvesting on Long-nosed Potoroos is also unclear as there have been few systematic studies, although a short term reduction in the potoroos population in response to disturbance is expected (see review in Claridge *et al.* 2007). Lunney *et al.* (2001) analysed predator scats in State Forest near Bega NSW and found the Long-nosed Potoroo population had increased and expanded in distribution 15 years after timber harvesting and a significant wildfire. Within Victoria, timber harvesting at any significant scale overlaps with Long-nosed Potoroo distribution only in East Gippsland.

Standard threat	Source Of Threat	Explanation
Carnivory	Animals – cats	Long-nosed Potoroos have been detected in the diet of feral cats and are within their preferred prey size range.
Carnivory	Animals – foxes	Long-nosed Potoroos are 'critical weight range' species, therefore, foxes are likely to be major predators of the species.
Habitat damage or loss	Vegetation clearance	Activities (such as regular grazing by stock or clearing for roads, firebreaks, mining, agriculture or urban developments) that permanently remove the vegetation or simplify the understorey where Long-nosed Potoroos live will remove or degrade habitat and is likely to make the habitat less suitable for Long-nosed Potoroos and increase vulnerability to predators.
Habitat loss or damage	Timber harvesting	Clearfall timber harvesting temporarily removes or significantly alters vegetation and can result in long term structural change to forest. Exposure to predators increases, at least until regeneration develops.
Habitat loss or damage	Climate change	Future projections of climate suggest reduced rainfall and increased average temperatures across much of south-eastern Australia, with associated vegetation change and increased risk of more frequent and severe bushfires (CSIRO and Bureau of Meteorology 2002). These potential changes may alter the suitability of current habitat for Long-nosed Potoroos.
Inappropriate fire regimes	Fire – frequency	High frequency fire will tend to simplify or change habitat structure (see Catling <i>et al.</i> 2001). Such changes in habitat may make it unsuitable for the Long-nosed Potoroo.
Inappropriate fire regimes	Fire – intensity	High intensity fire can kill animals or make them more vulnerable to predation.
Inappropriate fire regimes	Fire – season and extent	Fires which coincide with breeding may decrease breeding success. The preservation of unburnt patches is important both as refuges from predators and as habitat until burnt areas regenerate.

## Important populations

Location name	Land manager	Catchment	Bioregion
Ewing Morass W.R	Parks Victoria	East Gippsland	East Gippsland Lowlands
Lakes Entrance – Lake Tyers Coastal Reserve	Parks Victoria	East Gippsland	Gippsland Plain East Gippsland Lowlands
Lower Glenelg National Park	Parks Victoria	Glenelg Hopkins	Glenelg Plain Bridgewater Victorian Volcanic Plain
Cobboboonee National Park	Parks Victoria	Glenelg Hopkins	Glenelg Plain Bridgewater Victorian Volcanic Plain
Croajingolong National Park	Parks Victoria	East Gippsland	East Gippsland Lowlands East Gippsland Uplands
Coopracambra National Park	Parks Victoria	East Gippsland	East Gippsland Lowlands East Gippsland Uplands
Cape Conran Coastal Park	Parks Victoria	East Gippsland	East Gippsland Lowlands
Wilson's Promontory National Park	Parks Victoria	West Gippsland	Wilson's Promontory
French Island	Parks Victoria	Port Phillip and Westernport	Gippsland Plains
East Gippsland FMA	DEPI	East Gippsland	East Gippsland Lowlands East Gippsland Uplands
Great Otway National Park	Parks Victoria	Corangamite	Otway Ranges
Grampians National Park	Parks Victoria	Glenelg-Hopkins and Wimmera	Greater Grampians
Mt Clay State Forest	DEPI	Glenelg Hopkins	Victorian Volcanic Plain

## Past management actions

Action	Result explanation
Apply ecological burning	The preferred habitat of Long-nosed Potoroos is relatively fire-prone and will burn even under fairly mild conditions. Most areas currently occupied by Long-nosed Potoroos have thus been subject to fairly regular planned burning and the occasional bushfire. Consequently the presence of Long-nosed Potoroos and other threatened heathy woodland species has been an influence on the frequency of planned burns in heathy forest in East Gippsland (S. Henry, pers. comm.), with the intent that such burns leave a mosaic of burnt and unburnt patches and wetter areas, such as gullies, remain unburnt.

Action	Result explanation
Develop detailed population monitoring protocols	Protocols to monitor Long-nosed Potoroos have been developed for the 'Ark' projects. There are four such projects in Victoria: the Southern Ark (far east Gippsland), Central Highlands Arks (Toolangi and Marysville areas), Grampians Ark (Grampians National Park) and Glenelg Ark (Glenelg Hopkins area). Their principal purpose is to protect native mammals, birds and reptiles from the impact of introduced predators, especially foxes. Detection of potoroos relies on hair-tubes or remote cameras. Trapping grids have been employed to monitor population size.
Assess threats	There has been little specific investigation of the impact of various presumed threats on the Long-nosed Potoroo. Kavanagh <i>et al.</i> (2004) have reviewed broad response models of forest fauna to disturbance and Catling <i>et al.</i> (2001) reviewed effects of fire. Project Deliverance and the Ark projects have measured responses of the Long-nosed Potoroo to fox control. The effect of habitat clearance can be deduced from the absence of Long-Nosed Potoroos in areas that once supported suitable habitat. Smith (2013) investigated immediate post-fire survival of Long-nosed Potoroos.
Conduct survey to determine abundance/extent	Numerous surveys have targeted Long-nosed Potoroos or employed techniques that will detect potoroos. Older techniques such as live trapping and predator scat analysis have been replaced or supplemented successively by newer methods such as hair-tubing and remote cameras. The latter appears to be especially proficient at detecting Long-nosed Potoroos. Notable survey programs include the Land Conservation Council Regional surveys, forest block surveys, pre-logging coupe surveys, the monitoring programs associated with the Ark projects (Southern Ark, Glenelg Ark, Grampians Ark) and the Victorian Bushfire Royal Commission Threatened Species Surveys. Survey guidelines have been developed (DSEWPC 2011).
Provide input into regional fire management and operations plans	The habitat requirements of the Long-nosed Potoroo have been an influence on planned burning regimes where the species occurs in the Landscape Burning Zone.
Control introduced animals	Systematic control of foxes has occurred and continues to occur in areas covered by the Ark projects, as well as on Wilson's Promontory. DEPI has been working on developing and testing an effective bait and bait delivery method for cats. Over the past three years, Parks Victoria has also been controlling cats on French Island (where foxes are absent). Despite this recent work, there has been much less cat control than fox control in Victoria due to the absence of an efficient and cost effective broad scale cat control technique.
Undertake research into management requirements	Detailed research into the ecology of Long-nosed Potoroos in Victoria has occurred at Naringal (Bennett 1993), Cabbage Tree Creek (Claridge <i>et al.</i> 1993), Cape Conran (Ricciardello, 2006), French Island (Frankham <i>et al.</i> 2011) and Lake Tyers (Gaborov 2012). Other projects have also analysed potoroo habitat preferences, notably the work of Catling <i>et al.</i> (2001) in the Eden area.
Undertake research to identify key biological functions	The role of the Long-nosed Potoroo (and other fungivores) in the spread of hypogeous fungi and their associated role in forest health has been investigated by Claridge and Cork (1994) and reviewed by Claridge and Trappe (2004).
Undertake periodic surveillance monitoring of populations	Long-nosed Potoroos are monitored as part of the Ark projects in the Glenelg River area and in the Grampians. Near Cape Conran in East Gippsland Long-nosed Potoroos have been monitored with a fixed network of cage traps since 1997 as part of the Deliverance and Southern Ark projects (Murray <i>et al.</i> 2006). Ad hoc monitoring using traps and cameras also occurs at Red Bluff near Lake Tyers.
Assess impacts of bushfires	Effects of a bushfire on Long-nosed Potoroos have been monitored and modelled by Catling 1991, Catling <i>et al.</i> 2001 and Arthur <i>et al.</i> 2012. Numbers of resident potoroos remained low for several years after fire, began to increase 10 years after fire and were predicted to reach highest abundance after about 20 years.

## Conservation objectives

### Long term objective

To ensure that the Long-nosed Potoroo can flourish and retain its potential for evolutionary development in the wild in Victoria.

### Objectives of proposed management actions

- To protect major populations from predation by foxes and cats
- To increase knowledge of biology, ecology or management requirements
- To secure populations or habitat from potentially incompatible land use or catastrophic loss
- To maintain or improve condition of habitat

## Proposed management actions

To assist the conservation of the Long-nosed Potoroo, DEPI will consider the following actions when developing regulation, investment strategies and ecological, fire and land management policies.

The proposed management actions listed below are further elaborated in DEPI's Actions for Biodiversity Conservation (ABC) system. Detailed information about the actions and locations, including priorities, is held in this system and will be provided annually to land managers and other authorities.

Standard objective	Objective explanation	
<b>To secure and maintain the habitat of the Long-nosed Potoroo</b>	Core areas of habitat for the main potoroo populations are mostly on public land and a high proportion of this is in conservation reserves. However these populations are isolated from each other and some smaller populations on private land are not secured.	
Action	Details	Agents
<b>Secure the habitat of Long-nosed Potoroos outside conservation reserves.</b>	Encourage protection of known habitat of Long-nosed Potoroos on private land through conservation management agreements or covenants with landholders, supported by appropriate measures in shire planning schemes.  In area subject to timber harvesting maintain current prescriptions that protect waterways and associated vegetation as a refuge of any resident Long-nosed Potoroos as found in the <i>Code of Practice for Timber Production 2007</i> (DSE 2007) and the <i>Management Procedures for timber harvesting, roading and regeneration in Victoria's State forests</i> (DSE 2009).	DEPI Barwon-South West, Grampians, Port Phillip and Gippsland.

Standard objective	Objective explanation	
<b>To secure populations or habitat from potentially incompatible fire regimes or catastrophic loss through bushfire.</b>	Research suggests Long-nosed Potoroos prefer long unburnt vegetation, however individual populations are vulnerable to large-scale high-intensity bushfires.  The habitat of the Long-nosed Potoroo should be subject to fire regimes that are compatible with conservation of the species, and reduce the risk of populations being exposed to large-scale high intensity bushfires.	
Action	Details	Agents
<b>Provide input into regional fire management and operations plans</b>	Through the annual Fire Operations Planning Process, ensure fire operations in known Long-nosed Potoroo habitat are managed in a way that is consistent with current understanding of the tolerance of the species and maintain critical habitat elements, including appropriately-sized fire refuges.	DEPI Barwon-South West, Grampians, Port Phillip and Gippsland.  Parks Victoria

Standard objective	Objective explanation
<b>To protect populations of Long-nosed Potoroos from predation by introduced animals</b>	Predation by foxes and cats are likely to remain major threats to Long-nosed Potoroos. Reducing predation pressure can then lead to population increases and the expansion of local distributions.

Action	Details	Agents
<b>Control introduced predators</b>	<p>Continue fox control in East Gippsland, Wilsons Promontory, the Otways, the Grampians and in far South-West Victoria using the most efficient control protocols available.</p> <p>Continue regular fox surveillance on French Island to ensure that French Island remains fox-free. If foxes are detected undertake an immediate eradication program.</p> <p>Implement broad scale cat control across as much of the distribution of the Long-nosed Potoroo as possible when an effective technique becomes available.</p> <p>Undertake concurrent fox and cat control near significant populations immediately following fire, at least until refuges of dense vegetation return.</p>	<p>DEPI Barwon-South West, Grampians, Port Phillip and Gippsland.</p> <p>Parks Victoria</p>

Standard objective	Objective explanation
<b>To increase knowledge of biology, ecology or management requirements</b>	A key objective of research on the Long-nosed Potoroo should be to refine management guidelines for the species. Primary research goals include improving understanding of the species' distribution and population trends, and the impacts of potentially threatening processes, especially predation and fire.

Action	Details	Agents
<b>Assess threats</b>	Undertake research into the impact of feral cats on Long-nosed Potoroos, and support the development of landscape-scale cat control methods.	DEPI
<b>Conduct survey to determine abundance/extent</b>	Conduct systematic surveys to clarify distributions and habitat preferences within areas currently known to support the species. This program should be integrated where possible into other fauna survey and management activities, such as the Ark projects and VicForests prelogging fauna surveys. Also conduct surveys in areas predicted by species distribution modelling but with no recent records, notably the Mullungdung-Holey Plains area.	DEPI
<b>Undertake monitoring of populations to measure response to management treatments</b>	<p>Continue monitoring the response of Long-nosed Potoroos to fox control as part of the Ark projects.</p> <p>Research the species' response to fire regimes in association with biodiversity monitoring of planned burning with an emphasis on survivorship in the presence of introduced predators and effect on critical habitat elements, such as is already occurring as part of the Glenelg Ark project.</p>	DEPI
<b>Undertake research to identify key biological functions</b>	Encourage research into the role of the Long-nosed Potoroo in ecosystem functioning, especially their role in disseminating hypogeous fungi and affecting other ecosystem processes.	DEPI
<b>Undertake research to identify response to forest harvesting activities</b>	Encourage research into the effect of timber harvesting practices on Long-nosed Potoroo populations.	DEPI

## Personal Communications

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