

Australian Capital Territory

Nature Conservation (Eastern Bettong) Conservation Advice 2019

Notifiable instrument NI2019–316

made under the

Nature Conservation Act 2014, s 90C (Conservation Advice)

1 Name of instrument

This instrument is the *Nature Conservation (Eastern Bettong) Conservation Advice 2019*.

2 Commencement

This instrument commences on the day after its notification day.

3 Conservation advice for the Eastern Bettong

Schedule 1 sets out the conservation advice for the Eastern Bettong (*Bettongia gaimardi*).

4 Revocation

The *Nature Conservation (Eastern Bettong) Conservation Advice 2018 NI2018–491*

Arthur Georges
Chair, Scientific Committee
17 May 2019

Schedule 1

(see s 3)



ACT
Government

Environment, Planning and
Sustainable Development



CONSERVATION ADVICE

EASTERN BETTONG – *Bettongia gaimardi*

CONSERVATION STATUS

The Eastern Bettong *Bettongia gaimardi* is recognised as threatened in the following jurisdictions:

International **Near Threatened**, International Union for Conservation of Nature (IUCN) Red List

National **Extinct** (mainland sub-species), *Environment Protection and Biodiversity Conservation Act 1999*
Vulnerable (species); **Extinct** (mainland sub-species), The Action Plan for Australian Mammals 2012

ACT **Regionally Conservation Dependent** in the Regional category, *Nature Conservation Act 2014*

NSW **Extinct** (species), *Biodiversity Conservation Act 1995*

VIC **Threatened** (species), *Flora and Fauna Guarantee Act 1988*

Extinct (mainland sub-species), Advisory List of Threatened Vertebrate Fauna 2013

QLD **Extinct in the Wild** (mainland sub-species), *Nature Conservation Act 1992*

TAS **Protected**, *Wildlife (General) Regulations 2010*, *Nature Conservation Act 2002*

ELIGIBILITY CRITERIA

a – IUCN category – Near Threatened (Burbidge et al. 2016)

c – Reintroduced to historic ranges and managed under relevant guidelines

d – Reintroduced/translocated to ACT as part of a conservation initiative

TAXONOMY

Wakefield (1967) consolidated two species (*Bettongia cuniculus* and *B. gaimardi*) into a single species with two subspecies: the extant Tasmanian Bettong (*B. gaimardi cuniculus*) and the extinct Eastern Bettong (mainland) (*B. gaimardi gaimardi*).

A genetic study (Haouchar et al. 2016) of fossilised bones and museum skins combined with an existing DNA dataset shows the Tasmanian Bettong, *B. gaimardi cuniculus*, lies within the range of variation of the mainland Eastern Bettong, *B. gaimardi gaimardi*. The analysis does not strongly support the separation of the two subspecies, which suggests a more thorough assessment of their taxonomy is needed. However, current listings are based on the currently accepted taxonomy.



Eastern Bettong (Woodlands and Wetlands Trust)

DESCRIPTION AND ECOLOGY

The Eastern Bettong *Bettongia gaimardi* (Desmarest, 1822) is a strictly nocturnal, small macropod, typically grey-brown above with a paler underside and cream coloured legs. Pinkish flesh is noticeable around its mouth and naked brown nose, its forepaws and hind feet and the inside of the ears. In keeping with other bettongs, the hind feet are relatively long, while the forepaws have long, curved central claws.

Average adult measurements (Claridge et al. 2007):

- Head and body length: 323 (315–332) mm
- Tail length: 326 (288–345) mm
- Body mass: 1660 (1200–2240) g

Reproductive biology of the species (Rose 1987):

- Gestation: ~21 days
- Pouch life: up to 106 days
- Lactation after pouch vacation: 56–63 days
- Mass of young at pouch vacation: 279–370 g
- Mass of young at weaning: 1046–1350 g

The Eastern Bettong's prehensile tail is roughly the length of its body and often has a white tip. The tail is noticeably fleshy and an important storage organ for reserves, especially fat. Like most members of the family *Potoroidae*, little distinguishes male and female individuals although males may be slightly longer and slimmer. Eastern Bettongs may live for 3–6 years in the wild (Rose 1986).

Eastern Bettongs¹ were once thought to be solitary animals, coming together only to breed. However, observations from Mulligans Flat Woodland Sanctuary suggest communal habitation (A. Manning pers. comm.). Breeding occurs continuously with females producing two or three young per year for which they do all of the caring (Rose and Johnson 2008).

DISTRIBUTION AND HABITAT

The Eastern Bettong now occurs naturally only in Tasmania where it is common over much of the drier eastern half of the state from sea level to 1000 m. It occurs on Bruny Island and was reintroduced to Maria Island. The species disappeared from mainland Australia around the 1920s and earlier from the ACT (Short 1998; Menkhorst 2008). Its prior distribution occurred in an arc from the south-eastern corner of South Australia through the tablelands of eastern Australia to south-eastern Queensland (Seebeck and Rose 1989).

There are records of numerous 'Rat Kangaroos' in the ACT region and these were almost certainly Eastern Bettongs (Gillespie 1992; Smith 1992). The Eastern Bettong had probably disappeared from the ACT area by 1908. Additional observations of the Eastern Bettong on the lands that became the ACT and in surrounding regions, come from museum specimens, sub-fossil remains and bounty payments. Ford (in Ikin 2012) recently reviewed museum specimens of bettong species (including sub-fossil remains) and found that all specimens south of Sydney were of Eastern Bettongs, including records from eastern NSW that had been previously thought to be the Burrowing Bettong (*B. penicillata*). Sub-fossil remains of the Eastern Bettong in the ACT region, some of which date to less than 200 years old, come mostly from cave

¹ The Eastern Bettong disappeared from the mainland long before much was known about its biology. Therefore a lot of knowledge of the species comes from studies in Tasmania and from information on closely related species. However, increasingly more knowledge of the species is coming from research at Mulligans Flat Woodland Sanctuary and Tidbinbilla Nature Reserve.

deposits such as at London Bridge in the Burra Valley, Wombeyan, Yarrangobilly, Wee Jasper, Cotter and Michelago (Ford 2008; F. Ford pers. comm.).

Anecdotally, rat kangaroos were reported as a severe pest by Samuel Schumack who lived on "Spring Vale" at Weetangera from 1866 to 1915 (Schumack 1967). It is likely that the species was *Bettongia gaimardi* (Gillespie 1992).

Eastern Bettongs were reintroduced to the ACT in 2011 and 2012, with 60 adult bettongs translocated from the wild in Tasmania to establish two populations in the absence of exotic predators, at Tidbinbilla Nature Reserve and Mulligans Flat Woodland Sanctuary.

The Eastern Bettong inhabits well drained, open eucalypt and woodlands with grassy or heathy ground cover. The species also occurs in *Casuarina* forests with a similar groundcover. These *Casuarina* habitats, however, are apparently of secondary importance because the two main *Casuarina* species in Tasmania tend to be restricted to specific places, notably coastal fringes and drier places in the case of *Allocasuarina verticillata*, and watercourses for *A. littoralis*. However, Eastern Bettongs can persist in highly modified landscapes, as was observed in Tasmania when trapping the animals for the Mulligans Flat Woodland Experiment (A. Manning pers. comm.). The eucalypt and *Casuarina* habitats that occur in the eastern half of Tasmania probably resemble forests that the Eastern Bettong once occupied on the mainland. Likewise, the regions where it occurs in Tasmania and those it once occupied on the mainland encompass similar altitudes, with much suitable habitat between sea level and 1000 m above sea level in Tasmania and possibly slightly higher on the mainland.

Eastern Bettongs require habitat that provides suitable cover as they spend the day in nests constructed from plant material that they harvest and carry to the nesting site using their prehensile tails. Environments with low shrubs, tussock grass and fallen timber provide ideal places for the animal to conceal the nest (Rose 1986), while the nest itself plays an important role in thermoregulation (Rose and Rose 1998). Most relatively undisturbed forest is likely to provide suitable areas for nesting for the Eastern Bettong.

Members of the *Potoroidae* are obligate mycophagists². Similar to other potoroids, the Eastern Bettong relies heavily on the fruiting bodies of ectomycorrhizal hypogeous fungi³ — truffles — to meet its nutritional requirements. Eucalypt forests support a high diversity of hypogeous (underground) fungi⁴. In environments with sporadic rainfall, however, these fungi may not always be available and it is likely that the bettong also relies on foods such as roots, tubers, seeds, fruit and invertebrates (Maser et al. 2008; Munro et al. in prep). Bettongs are well equipped for this strategy, being mobile (as shown by large home ranges of 65–135 ha and traversing long distances to feeding areas); having powerful claws for digging; and having highly developed olfactory regions in the brain (Wallis 1990; Rose and Johnson 2008; Munro et al. in prep).

THREATS

The main threat to the Eastern Bettong, should they be reintroduced to the wild on the Australian mainland, is predation by red foxes and to a lesser extent feral cats, as identified in the Mammal Action Plan (Woinarski et al. 2014). Other potential threats include:

² Obligate mycophagists obtain most of their nutritional requirements from fungi.

³ Those that form a symbiotic relationship with plant roots and that produce underground fruiting bodies – truffles.

⁴ Maser et al. (2008) note that it is not unusual to identify 50 fungi species during scat analysis p.280.

- habitat clearing/fragmentation of its dry forest and woodland habitat
- habitat degradation and competition from livestock/introduced herbivores including overgrazing by livestock and rabbits
- inappropriate fire regimes (e.g. Vernes et al. 2001)
- previously – hunting/persecution/poisoning
- viral or other diseases
- climate change (e.g. Bateman et al. 2012)

MAJOR CONSERVATION OBJECTIVES

The priority management objectives for the Eastern Bettong in the ACT relate to the three areas of conservation action, namely: (1) the establishment of a captive colony at Tidbinbilla Nature Reserve; (2) the maintenance of the fenced population at Mulligans Flat/Goorooyaroo and possible establishment elsewhere in the ACT; and (3) the translocation of the Eastern Bettong in the wild in the ACT. As such, the objectives for management are to:

- enable the ACT to contribute effectively to the national objective of translocating viable, wild populations of the Eastern Bettong to the Australian mainland (Australian Government 2015)
- establish and maintain one or more fenced areas within the ACT (e.g. Mulligans Flat) to protect and rehabilitate habitat of the Eastern Bettong (in particular, well drained, open eucalypt and woodlands with grassy or heathy ground cover) and other species of concern through intensive management of introduced predators and other pest species
- establish a captive breeding colony of the Eastern Bettong in the ACT
- undertake research of immediate relevance to achieving the above objectives, in an adaptive management context
- provide opportunity for strategic research into the biology of the Eastern Bettong by third parties, research that may subsequently be relevant to management in captivity or in the wild, or subsequently become relevant as circumstances change and
- provide opportunity to build constituency and community awareness of native species conservation and opportunities for the community to become directly involved in conservation action.

CONSERVATION ISSUES

Current management has been guided by the *ACT Management Plan for the Eastern Bettong* (Ikin 2012). The future management of the species is the subject of an ACT Native Species Conservation Plan for the Eastern Bettong developed by the Conservator under Part 5.3 of the *Nature Conservation Act 2014*.

Captive populations of the Eastern Bettong, based on the 60 individuals sourced from Tasmania in 2011 and 2012, have been established in the Tidbinbilla Nature Reserve (TNR) and released to Mulligans Flat Woodland Sanctuary in the ACT, areas that are fenced to exclude cats and foxes.

Captive Colony

At Tidbinbilla Nature Reserve the population is managed as a captive breeding ‘insurance’ population and to provide opportunity for research into animal husbandry, reproductive biology of the species, and potentially for trials of fertility control measures. As an insurance colony, it is important to assess and maintain the genetic diversity of the captives. Maintaining genetic diversity is important should the fenced population need to be augmented or re-established should it decline or fail; or should stocks be needed elsewhere in Australia. Genetic diversity needs to be assessed in the context of genetic diversity of captive colonies established elsewhere in Australia.

Mulligans Flat-Goorooyarroo

The population at the Mulligans Flat Woodlands Sanctuary, to be expanded to include Goorooyarroo Nature Reserve, is considered a contained population, protected from exotic predators, but open to the semi-natural variations of population density. Based on recent population surveys, there are approximately 35 Eastern Bettongs at Tidbinbilla Nature Reserve (November 2017) and 140 Eastern Bettongs at Mulligans Flat (Summer 2018).

Specific management issues to be considered for the Mulligans Flat/Goorooyarroo reserve population are:

- (a) whether the reserve is a stepping stone to support ultimate wild releases and establishment of the Eastern Bettong in the wild, or whether it is to also be considered an end in itself, that is, the first of what may be several 'mainland islands' (sensu Saunders and Norton 2001, see also Legge et al. 2018) established as a sustainable, long-term solution to the historical loss of iconic native species from the ACT
- (b) the so-called *fence effect* (sensu Krebs et al. 1969). Briefly, dispersal for many species is an integral component of regulation of their abundance, so fencing can result in increases in abundance that need to be addressed by management
- (c) potentially conflicting needs of other threatened species within the reserve as manipulation of habitat to meet the needs of one species can alter habitat suitability for another
- (d) Climate change, and in particular drying of habitat, is of particular concern for the bettong and species that are relying on soil biota for their sustenance.

Reintroduction to the Wild

A trial release of Eastern Bettongs into the wild in the ACT was undertaken to evaluate its feasibility. Bettongs were released into an area of the Lower Cotter Catchment assessed to be suitable habitat for this species and subject to intensive predator control prior to, and following, the first release. Monitoring of the released bettongs revealed a progressive decline and there are considered to be no animals remaining in the wild.

Specific conservation issues to be considered for wild release are:

- (a) the need to determine targets for control of predator numbers necessary for the successful translocation and establishment of the bettong in the wild
- (b) assessment of whether achieving such predator control targets is feasible, and if it is, whether the predator control program can be sustained indefinitely with available resources, including funding
- (c) consideration of the naïveté of captive-raised bettongs and those living in the absence of predators (Moseby et al. 2015)
- (d) explicit consideration of the impact of predator control on native predators (e.g. dingo)
- (e) the need for assessment of the release proposal/translocation plan by relevant independent experts in the context of international best practice on translocations
- (f) commitment to transparent planning, monitoring, evaluation and accountability of any releases, preferably involving a relevant independent expert authority.

OTHER RELEVANT ADVICE, PLANS OR PRESCRIPTIONS

- ACT Native Species Conservation Plan for the Eastern Bettong (ACT Government — in prep).
- ACT Management Plan for the Eastern Bettong *Bettongia gaimardi* (Ikin 2012).
- The Action Plan for Australian Mammals (Woinarski et al. 2012).

- Guidelines for Reintroductions and Other Conservation Translocations (IUCN/SSC 2013).
- Translocation for Conservation (Australasian Wildlife Management Society 2013).
- Conservator Guidelines for the Translocation of Native Flora and Fauna in the ACT (ACT Government 2018).

LISTING BACKGROUND

The Eastern Bettong *Bettongia gaimardi* is listed as Regionally Conservation Dependent in the ACT. The Eastern Bettong was not previously listed as threatened in the ACT as it was likely locally extinct since the early 1900s, until reintroductions to Tidbinbilla Nature Reserve and Mulligans Flat Woodland Sanctuary in 2012. The mainland sub-species, *Bettongia gaimardi gaimardi*, was listed as presumed extinct under Schedule 1 of the *Endangered Species Protection Act 1992* (Cwlth), 19 January 2000, and transferred to the Extinct category under the EPBC Act, 16 July 2000.

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FURTHER INFORMATION

Further information on this species or other threatened species and ecological communities can be obtained from the Environment, Planning and Sustainable Development Directorate (EPSDD).

Phone: (02) 132281, EPSDD Website: <http://www.environment.act.gov.au/cpr>