Department of Sustainability and Environment

Action Statement

Flora and Fauna Guarantee Act 1988 No. 4 (Revised in 2009)

Eastern Barred Bandicoot (mainland)
Perameles gunnii (unnamed subspecies)

This Action Statement is based on the Recovery Plan prepared for this species by DSE under contract to the Commonwealth Department of the Environment, Water, Heritage and the Arts.

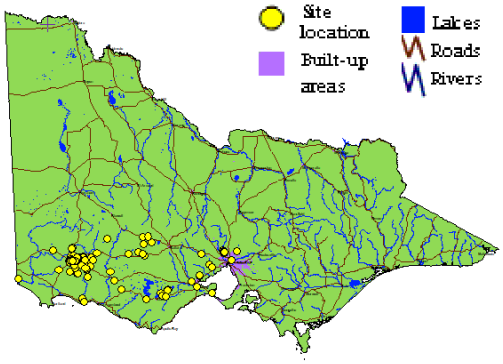
Description

The Eastern Barred Bandicoot is a small, 'rabbit-sized', terrestrial marsupial of the Peramelidae family. It is approximately 300 mm in length (body) with a 110 mm long tail. On average, Eastern Barred Bandicoots weigh approximately 800 g, but individuals may weigh up to 1100 g. The fur is grey-brown to buff above, somewhat paler on the sides and pale grey to white below, with three or four pale bars on the hindquarters (giving rise to the common name) (Brown 1989; Seebeck 1979). The Tasmanian and mainland forms are considered to be different at the subspecies level (Robinson *et al.* 1993), although this has not yet been reflected in any formal taxonomic designation.

Eastern Barred Bandicoot (mainland)
Perameles gunnii (unnamed subspecies)
(Photo: Ian McCann)

Distribution

The Eastern Barred Bandicoot is restricted to south-eastern Australia. In Tasmania, it is found in the east and north of the state (Mallick *et al.* 1997). On the Australian mainland, the species once occurred from near Melbourne through south-western Victoria to the far south-eastern corner of South Australia, occupying a total range of about three million hectares (Seebeck 1979; Brown 1989; Kemper 1990). Since European settlement, however, the species has undergone a widespread, sustained and catastrophic decline in range and abundance on the mainland. The mainland subspecies is now considered extinct in the wild. In Tasmania, the species is still widely distributed but has reduced in numbers, primarily due to loss of habitat, and is still declining in some areas (Mallick *et al.* 1997). Reintroductions have been attempted at multiple locations within the species' former range in south-western Victoria, and several small reintroduced populations are currently extant. The Eastern Barred Bandicoot's range



Distribution in Victoria
(Victorian Fauna Database DSE 2007)

within Victoria is encompassed by the Victorian Volcanic Plains IBRA bioregion (*sensu* DEH 2000).

Abundance

It is estimated that there are about 100 - 150 individuals in three reintroduced populations in Victoria. Six captive populations comprise approximately 40 individuals.

Important populations

Eastern Barred Bandicoots (mainland supspecies) are now considered extinct in the wild. The last confirmed sighting of a wild individual was in 2002 at Hamilton in south-western Victoria. Attempts have been made to establish reintroduced populations at eight sites within the species' former range, of which three currently have extant populations. The reintroduction sites are as follows:

Woodlands Historic Park (Gellibrand) (Extinct)

The Woodlands Historic Park reintroduction site is a 300 ha nature reserve containing open grassy woodlands and is enclosed by a 1.8 m high electrified predator barrier fence. The first release into the nature reserve occurred in April 1989, and a total of approximately 174 animals were released up to 2004 (Winnard and Coulson 2008). The population established and expanded quickly. In 1994/5 it reached its peak, with over 600 bandicoots believed to be occupying the entire reserve (Winnard and Coulson 2008). The population then declined markedly, probably due to a combination of predation by Red Foxes (*Vulpes vulpes*) (which were able to gain access to the reserve due to deficiencies in the fence design), drought, overgrazing by kangaroos and rabbits, and the removal of approximately 100 bandicoots for translocation to other sites (Watson and Halley 2000). The last bandicoot caught at Woodlands was in 2005, and this population is now considered extinct.

Hamilton Community Parklands (Extant)

The Hamilton Community Parklands on the northern perimeter of Hamilton contains an area of 100 ha of plains grassy woodland enclosed by a 1.8 m high electrified predator control fence. More than 120 bandicoots were released into the reserve between 1991 and 2003. The population reached a maximum recorded size of about 90 animals during 1993, but declined markedly and was presumed extinct in 2005. The fence design was ineffective at excluding foxes, and in 2005 it was upgraded to include a floppy top. Once the reserve was determined to fox-free in 2007, another 30 bandicoots were released. Evidence of breeding was noted just three weeks after the release. The population is increasing and now occupies the entire reserve. No foxes have gained access to the reserve since the release, and fence maintenance is regular and ongoing. The current population size is thought to be 50 – 80 individuals (March 2009).

Mooramong (Extant)

'Mooramong' is a 1500 ha farming property, 170 km west of Melbourne, which is owned and managed by the National Trust of Australia (Victoria). Within the property is a 200 ha nature reserve (130 ha of wetlands, and 70 ha of grassland and shrubland) which has stock-proof fences but does not have electrified predator control fences. Between 1992 and 1995, 85 bandicoots were released into the reserve, and quickly became established, with breeding and recruitment regularly observed (Winnard and Coulson 2008). The population declined in the late 1990s, possibly due to severe drought conditions. The population managed to recover but is currently going through a second decline, the cause of which is unknown. Fewer than ten animals were known to be alive at Mooramong in March 2009. An extensive predator control program is maintained at the property.

Mount Rothwell (Extant)

Mount Rothwell is situated 60 km west of Melbourne. The reserve contains 400 ha of open grassy woodlands and grasslands, and is surrounded by an effective predator barrier fence. Thirty bandicoots were released here between 2004 and 2009. The population is considered to be increasing despite the reserve being overgrazed by macropods. No foxes have gained access to the reserve since their initial removal; fence checks and maintenance occur on a daily basis. The total population size is currently (2009) estimated to be 40 – 50 individuals and is still increasing.

Lake Goldsmith Wildlife Reserve (Extinct)

Lake Goldsmith Wildlife Reserve, located 50 km west of Ballarat, is 870 ha in area, most of which is a shallow temporary lake which fills in years of high rainfall. The reserve includes 150 ha of unfenced grassland vegetation. Fifty bandicoots were released here between 1994 and 1998 (Winnard and Coulson 2008). The population declined during the early part of 1998, most likely as a result of the drought. The last bandicoot caught at Lake Goldsmith was in 2005 (Winnard and Coulson 2008). This population is now considered extinct.

Lanark (Extinct)

'Lanark' is a privately-owned 800 ha farm, 30 km south-west of Hamilton. On the property, 63 ha of seasonal and permanent wetlands and 48 ha of revegetated shelterbelts and bush blocks have been established, while the remainder is open sheep paddocks and commercial tree farm. A total of 63 bandicoots were released at Lanark between 1994 and 2002 (Winnard and Coulson 2008).

Initial trapping results indicated good reproduction and recruitment, with a total of 46 bandicoots recorded as being bred at Lanark. By 2003, however, the population declined markedly, possibly due to a combination of drought and reductions in predator control efforts. No evidence of bandicoots has been observed at Lanark since 2005 and the population is now considered extinct.

Floating Islands Nature Reserve (Extinct)
Floating Islands Nature Reserve is a small (85 ha) reserve, 20 km west of Colac, and is managed by Parks Victoria. The reserve comprises a mosaic of open grasslands, dense shrublands and woodlands on stony basalt rises interspersed with swampy depressions. Fifty bandicoots were released at this site between 1994 and 1997 (Winnard and Coulson 2008). Breeding did occur, but the population was considered extinct by 1999, most likely due to difficulties in predator control.

Cobra Killuc Wildlife Reserve (Extinct)
Cobra Killuc Wildlife Reserve is an area of 500 ha of grassland and grassy woodland. A total of 103 bandicoots were released between 1997 and 1999, but a combination of predation, drought and overgrazing by kangaroos are thought to have caused the population to decline to extinction by 2002 (Winnard and Coulson 2008).

Habitat

On mainland Australia, the original habitat of the Eastern Barred Bandicoot was probably native perennial tussock grasslands and grassy woodlands, particularly along watercourses (Brown 1989; Dufty 1994; Seebeck 1979). There are historical records from South Australia of the species occurring in open forest and scrubland (Kemper 1990).

Eastern Barred Bandicoots appear to prefer areas with high soil moisture content, such as swampy depressions, poorly drained areas and creek margins (Dufty 1991; Seebeck 1979). Bandicoots are reported to concentrate in areas of higher soil moisture during periods of low rainfall, possibly because of higher invertebrate numbers in these areas (Robinson *et al.* 1991), or because it is easier for them to forage in the moist soil (Seebeck *et al.* 1990).

The last known remaining wild mainland population occurred along a watercourse on the outskirts of Hamilton, a city in south-western Victoria. Eastern Barred Bandicoots survived there in highly modified habitats such as tree plantations, farmland, gardens and parklands: areas often dominated by weed species such as Gorse (*Ulex europaeus*) and Sharp Rush (*Juncus acutus* subsp. *acutus*) (Brown 1989; Dufty 1994). Bandicoots at this site tended to forage in sites with uncompacted, acid soils, high ground cover and tall grasses (Dufty 1991). They were rarely observed foraging more than 20 m away from thick cover, and were not trapped more than 60 m from the nearest shelter (Dufty 1994). Bandicoots constructed grass-lined nests within a range of natural and artificial locations including introduced shrubs, culverts, car tyres and steel guttering, and also nested within constructed bandicoot shelters (Dufty 1994).

The Eastern Barred Bandicoot requires structurally complex habitats with dense cover for nesting adjacent to more open areas suitable for feeding (Cook 2001; Dufty 1991). A study by Cook (2001) found that bandicoot diggings at reintroduction sites were associated with Black Wattle (*Acacia mearnsii*), Spike Wattle (*Acacia paradoxa*), Willow Wattle (*Acacia salicina*), Kangaroo Grass (*Themeda triandra*) and four species of herbs, and were negatively correlated with Bracken (*Pteridium esculentum*) and Chocolate Lily (*Arthropodium strictum*). Male Eastern Barred Bandicoots ranged more widely where there was more tree cover, although only outside the breeding season (Jenkins 1989).

Life history and ecology

The species is short-lived and generally only survives 2 – 3 years in the wild, but it can be highly fecund. Gestation lasts 12 – 13 days, and litters comprise 1 – 5 young (average 2 – 3). Young bandicoots remain in the pouch for approximately 55 days, becoming independent and dispersing about three months after birth. Females may breed from four months of age and, by utilising a strategy of alternating nipples, can give birth to another litter immediately after the previous litter has left the pouch. Reproduction may occur throughout the year, but is depressed during late summer and may cease altogether during times of drought. In favourable conditions, a single female is capable of producing three or more litters a year (Seebeck 1979).

Eastern Barred Bandicoots occupy partly overlapping home ranges (Jenkins 1998; Mallick *et al.* 2000), with males occupying significantly larger areas than females (males 4 – 13 ha; females 1.9 – 6.4 ha; Jenkins 1998). Densities vary markedly within and between sites, and between years (Jenkins 1998; Minta *et al.* 1990). Recorded densities in Victoria range from 0.45 to 5.25 animals/ha (Brown 1989; Dufty 1988, 1991; Minta *et al.* 1990). In Tasmania, Mallick *et al.* (2000) reported densities of 0.35 – 2.35 animals/ ha, and home range sizes of 4.3 ha for males and 2.3 ha for females.

The Eastern Barred Bandicoot is considered to be primarily insectivorous. Cook (2001) studied bandicoot diet in spring and summer at all reintroduction sites. Bandicoots preferentially ate only a few invertebrate taxa from the Coleoptera and Diplopoda, and supplemented this diet with a

wide range of other invertebrates. Other studies have found that oligochaetes are important in wetter months (Brown 1989; Dufty 1994). Coleopterans, orthopterans, hymenopterans and lepidopterans are eaten with varying frequency (Hannan 1994; Dufty 1994). Eastern Barred Bandicoots also eat some plant material, including the bulbs of Onion Grass (*Romulea rosea*) and orchard fruit (Brown 1989; Dufty 1991). In Tasmania, hypogeal and gastromycete sporocarps from hypogeal fungi are regularly eaten (Mallick *et al.* 1997; Quinn 1985; Reimer & Hindell 1996). Cook (2001) found that the invertebrates preferred by Eastern Barred Bandicoots were more common where trees and shrubs were present.

Conservation status

National conservation status

The Eastern Barred Bandicoot (mainland subspecies) is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

Victorian conservation status

The Eastern Barred Bandicoot (mainland subspecies) is listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988.*

It is considered critically endangered in Victoria according to DSE's *Advisory List of Threatened Vertebrate Fauna in Victoria – 2003* (DSE 2003).

Decline and threats

The mainland subspecies of the Eastern Barred Bandicoot has undergone a widespread, sustained and catastrophic decline in range and abundance since European settlement. The last recorded specimen from South Australia was collected in the late 1800s (Kemper 1990). In Victoria, it was still relatively widespread and even common in some districts until 1930 (Brown 1989). By 1972, however, the Eastern Barred Bandicoot was extinct throughout its mainland range, except for a small population near the City of Hamilton in western Victoria (Seebeck 1979; Brown 1989). In the 1970s, the Hamilton population occurred across approximately 3000 ha, and may have contained more than 1000 individuals. The area occupied declined to about 1400 ha by 1985 and to about 600 ha by 1988, with the population declining to 180 - 220 animals. The last remaining wild population of mainland Eastern Barred Bandicoots was on the verge of extinction by 1991 (Brown 1989; Clark and Goldstraw 1991; Clark *et al.* 1995; Seebeck *et al.* 1990). A subsequent review of the recovery program concluded that the mainland Eastern Barred Bandicoot was effectively 'lost' as a wild species and active management of the population ceased (Backhouse 1992). The last confirmed sighting from the Hamilton population was in 2002, and the mainland subspecies of the Eastern Barred Bandicoot is now considered extinct in the wild.

The main threats to the Eastern Barred Bandicoot are summarised as follows:

Introduced Predators

Red Foxes are considered the primary cause of extinction of a number of Australian mammals, particularly small- to medium-sized ground mammals such as the Eastern Barred Bandicoot (Burbidge & McKenzie 1989). Control of predators is considered a key requirement for the successful reintroduction of Eastern Barred Bandicoots (Watson and Halley 2000). Foxes were present at all five reintroduction sites where populations have now become extinct. One site, Woodlands Historic Park, did have a predator barrier fence but this fence did not successfully exclude all foxes (Winnard and Coulson 2008). If fox control is continuous and intensive, Eastern Barred Bandicoot populations can persist in the presence of foxes, as is evident from Mooramong. However, interruptions in the predator control program occurred at the five now extinct reintroduction sites, and fox predation was the main cause of decline in these populations. In recent years, the recovery team has only released Eastern Barred Bandicoots into Hamilton Community Parklands and Mt Rothwell as these are the only reserves that can be guaranteed fox free.

Cats will also prey upon Eastern Barred Bandicoots, particularly juveniles (Lenghaus *et al.* 1990), but their impact on populations is less severe than that of foxes. Recent evidence of this comes from Hamilton Community Parklands when a cat managed to gain access to the reserve in 2007. The length of time the cat was present in the reserve is unknown, but a decline in the population or the number of recruits was not observed during quarterly monitoring.

Habitat Loss or Modification

Over 99% of the state's native grasslands and grassy woodlands, in which the species formerly occurred, have disappeared (Scarlett *et al.* 1992). Extensive habitat alteration and destruction has occurred through the clearing of woodlands, establishment of exotic pasture grasses, grazing by domestic stock and macropods, altered fire regimes, addition of fertilisers, the introduction of rabbits and drought. The ecological community 'Natural Temperate Grassland of the Victorian Volcanic Plain', which encompasses the distribution and habitat of the Eastern Barred Bandicoot, is listed as a critically endangered community under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999.*

Habitat complexity is an important component of Eastern Barred Bandicoot habitat: lack of habitat

heterogeneity is thought to have limited the area of potential habitat for Hamilton population (Cook 2001; Dufty 1991, 1994). It has been recommended that habitat management should focus on creating a structurally heterogeneous mosaic of feeding areas and dense cover to provide shelter from predators (Dufty 1994; Reading *et al.* 1996). In the absence of foxes, however, the Eastern Barred Bandicoots habitat requirements appear to expand significantly: this is currently being investigated.

The effect of drought on Eastern Barred Bandicoot populations is not fully understood. Prolonged drought/below average rainfall in western Victoria occurred between 1997 and 2002, and this probably contributed to population declines and extinctions of reintroduced populations. The negative effect of drought was thought to be due to the inferred impact of low soil moisture on bandicoot foraging success and breeding. However, current research and the presence of poor vegetation cover at Mount Rothwell suggest that this may not be the case. At four reintroduction sites, Woodlands Historic Park, Hamilton Community Parklands, Lake Goldsmith and Lanark, total population sizes became very small during the 1997 - 2002 drought period, increasing the risk of population extinction and genetic drift. All four of these sites had predator control issues. The amount of vegetative cover and, consequently, the availability of bandicoot nesting sites and hiding places were reduced by continued drought. In turn, bandicoots were more susceptible to predation. Thus, the effect of drought seems to be exacerbated in the presence of foxes, and the cumulative effects can lead to population declines and extinctions.

Mount Rothwell is currently overgrazed by macropods and enduring a prolonged drought, and is an excellent example of the harsh conditions in which bandicoots are able to persist in the absence of foxes. Implementation of a plan to control grazing pressure at Mt Rothwell is expected to markedly increase habitat suitability at this site.

Small population size

This is now an identified threat: inbreeding effects and very low heterozygosity measures have been identified within the mainland Eastern Barred Bandicoot population.

Previous management action

Wild Population Management at Hamilton

The status of the Eastern Barred Bandicoot population at Hamilton was first investigated in the early 1960s. Further investigation during the 1970s showed that the species had suffered a substantial decline in range and abundance across its former range (Seebeck 1979). Brown (1989) began studying the Hamilton population in 1980.

Active management for bandicoot conservation commenced in the early 1980s, and aimed to enhance and develop habitat. Considerable effort went gone into the Eastern Barred Bandicoot recovery program at Hamilton (for a complete summary see Arnold *et al.* 1990). Work was undertaken to develop and extend habitat in Hamilton by providing habitat strips and hard shelters, and purchasing land. Predator control was also attempted through trapping, shooting and the promotion of responsible pet ownership. Road mortality was addressed through the provision of warning signs and reflectors. Community workshops were held, and information displays and brochures were prepared to assist in community education. Despite this intensive effort, the range and total population size of Eastern Barred Bandicoots at Hamilton continued to contract. Following an extensive review of the options for the management of this wild population in the early 1990s, it was decided that it was not possible to successfully recover this population and a decision was made to remove the wild population. All animals that could be trapped were relocated to the Woodlands Historic Park.

Management and Recovery Plans

In 1982, the first (interim) management prescriptions were produced in an attempt to conserve the species at Hamilton. A draft management plan was published in 1987, and the final management plan was released in 1989 (Brown 1989). The first Action Statement was prepared in 1991 (Fisher and Norman 1991), a new recovery plan for the species in Victoria was prepared in 1992 (Backhouse 1992), and another recovery plan is currently being prepared (Watson *et al.* in prep.).

Captive Breeding

A captive colony of mainland Eastern Barred Bandicoots was established in pens at Woodlands Historic Park in 1988, to be used as a source for releases into the nature reserve. Although reproduction did occur, recruitment was lower than expected (Watson 1991, Myroniuk 1995). In 1992, Zoos Victoria assumed responsibility for captive breeding and switched to intensively managed facilities to breed bandicoots for re-introductions. Bandicoots have since been bred for the recovery program at all three Zoos Victoria properties (Healesville Sanctuary, Melbourne Zoo, Werribee Zoo), and at other facilities within Victoria and interstate.

Re-introductions

Eastern Barred Bandicoots were first reintroduced into extensive fenced enclosures, resulting in the establishment of two confined or 'semi-wild' populations. As part of the management plan for the species, one population was established in the

300 ha nature reserve within Woodlands Historic Park in 1989 (Brown 1989). The second population was established at Hamilton in a 100 ha enclosure within the Hamilton Community Parklands (HCP) in 1990. This was a community initiative led by the Hamilton Institute of Rural Learning, and the fence was constructed with funds provided by CNR.

The Woodlands Historic Park population increased to an estimated 600 animals in 1995 but then declined markedly over the next few years (Winnard and Coulson 2008). The last bandicoot was caught at Woodlands in 2005, and the population is now considered extinct. The HCP population initially went extinct but was reintroduced in 2007 after the fence was upgraded and is currently persisting.

The first free-ranging, wild reintroduction occurred on the National Trust property "Mooramong", near Skipton in south-western Victoria. Although the population was initially successful, it has since been through two severe declines. Extensive predator control is maintained through poison baiting and shooting.

Based on the early success at "Mooramong", four new re-introductions commenced between 1994 and 2002, with 50 bandicoots released at Floating Islands reserve near Colac, 50 at Lake Goldsmith reserve near Beaufort, 63 on private property at Branxholme, and 103 at Cobra Killuc Wildlife Reserve near Mortlake. Habitat preparation and predator control were carried out at each site before the first release. Despite early signs of breeding and successful establishment, all of these populations declined to effective extinction in the late 1990s or early 2000s due to predation and prolonged drought.

Thirty bandicoots were released at the Mount Rothwell Conservation and Research Centre in the You Yangs between 2004 and 2009. Predator barrier fencing has been extremely effective at this site, and the bandicoot population is considered to be increasing.

See Winnard and Coulson (2008) for a review of the Eastern Barred Bandicoot reintroduction work.

Research

A range of research on the Eastern Barred Bandicoot has been undertaken over the last decade, including population monitoring, ecological studies, habitat analysis, and taxonomic and genetic research.

Community Involvement

Community interest and involvement in the recovery program has been high, although mostly based in Hamilton. Community-based 'bandicoot action groups' in Hamilton were established to undertake local habitat management and predator control. The establishment of the HCP semi-wild population was the result of a community initiative, through the Hamilton Institute of Rural Learning. The Friends of the Eastern Barred Bandicoot group was formed in 1991. With the broadening of the recovery effort beyond Hamilton, other community groups, including Friends of Gellibrand Hill Park and Friends of Mooramong, are also involved in local conservation works for bandicoots.

Program Review and Evaluation

When the last remaining wild population at Hamilton declined toward extinction in 1991, the recovery program was reviewed and evaluated (see Reading *et al.* 1992b). This major review identified problems with previous recovery efforts, proposed a range of solutions and set new program directions. Since then, major annual reviews have been held as well as regular smaller reviews by working groups and recovery teams.

Involvement of Other Organisations

A feature of the recovery program has been the involvement of a large number of external agencies and individuals in the recovery effort. In particular, the Northern Rockies Conservation Cooperative, Yale University School of Forestry and Environmental Studies, and the Chicago Zoological Society were instrumental in expanding the range of expertise available to the recovery effort. A great deal of the research on the species has been undertaken by universities, including the University of Melbourne, La Trobe University, Deakin University and the University of Ballarat. The National Trust of Australia (Victoria) has been heavily involved in the re-introduction at its property "Mooramong". The South Australian Department of Environment and Natural Resources and the Zoological Parks Board of New South Wales have assisted by breeding bandicoots for the recovery program.

Objectives and intended management actions

The intended management actions listed below are further elaborated in DSE'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.

Objective I Establish and monitor self-sustaining reintroduced populations

Action	*Targets*	*Responsible*
1. Monitor the reintroduced populations. Intensively monitor Eastern Barred Bandicoot populations, habitat quality, and predator activity at a minimum of two reintroduction sites to identify the key variables influencing population performance. Develop and apply revised population monitoring protocols at reintroduction sites.	▪ Monitoring data on reintroduced populations collected regularly. ▪ Bandicoot survival reported annually, in relation to site characteristics. ▪ Recommendations for site management protocols produced, based on this information ▪ .Monitoring techniques refined and modified as highlighted in Action 3.	DSE Parks Victoria National Trust Recovery Team
2. Compile, maintain and assess information.	▪ All monitoring and predator control data stored on a single database and updated regularly. ▪ Annual reports of recovery effort progress published on DSE website.	DSE South West
3. Revise monitoring procedures to reflect new information needs. Information needs at each reintroduction site may include population annual rate of change, absolute population size, predator activity, and a number of habitat measures.	▪ Revised population, site and predator monitoring protocols produced ▪ Additional information gaps identified.	DSE
4. Establish minimum population targets for the reintroduced populations. Define the size and composition of a self-sustaining reintroduced population and establish target population sizes for each reintroduced population. Assess the potential role of each reintroduction site to contribute to this viable reintroduced population. Assess the need for additional reintroduction sites to achieve a viable reintroduced population. Produce recommendations for timing and composition of releases, and population triggers for releases at reintroduction sites.	▪ Population targets (or minimums) set for overall reintroduced population and for individual reintroduction sites. ▪ The potential role of each reintroduction site assessed. ▪ The need for additional reintroduction sites evaluated. ▪ Recommendations for timing, composition and triggers of releases developed for reintroduction sites.	DSE
5. Manage releases and translocations to meet site-specific population targets.	▪ Population rate of increase for combined reintroduced populations positive or neutral. ▪ Reintroduced population targets met. ▪ Need for captive-bred supplementation of reintroduced populations removed.	DSE South West Parks Victoria
6. Maintain mortality database and use information to refine site, predator management and pre-release protocols.	▪ Mortality database maintained ▪ Information used to inform site, predator management and pre-release protocols.	Zoos Victoria

7. Assess the need for supplementation of reintroduced population at year 5. Assess reintroduced populations against population targets.	▪ Overall and specific objectives reviewed against reintroduced population targets.	DSE
8. Investigate the introduction of Eastern Barred Bandicoots onto a fox-free island using standard introduction risk analyses evaluating both environmental and social risks and benefits of the proposal.	▪ Suitability of French Island for the release of Eastern Barred Bandicoots thoroughly investigated.	Recovery Team
9. Establish a population of Eastern Barred Bandicoots on French Island.	▪ If Action 8 supports an introduction to French Island, introduction plan implemented.	Recovery Team DSE South West
10. Maintain Recovery Team to supervise the project, report on progress against objectives and performance criteria, and manage a budget.	▪ Recovery team maintained.	DSE South West

Objective II Monitor and manage threats and habitat at reintroduction sites

Action	*Targets*	*Responsible*
11. Undertake habitat monitoring and manage habitat according to site management protocols.	▪ Habitat management targets met at each site and reviewed annually. ▪ Habitat at reintroduction sites monitored regularly using photopoints and soil density measures. ▪ New site monitoring and management protocols adopted as they become available. ▪ Management actions (outlined below) undertaken to significantly improve the quality and extent of habitat at reintroduction sites.	DSE South West Parks Victoria National Trust Private
12. Monitor and control cats and foxes according to predator management protocols.	▪ Predator activity targets met at each reintroduction site and reviewed annually. ▪ Predator-barrier fences maintained at sites with extant Eastern Barred Bandicoot populations. ▪ Revised predator monitoring and management protocols applied as available.	DSE South West Parks Victoria National Trust Private
13. Manage and control environmental weeds (especially flat weeds and serated tussock).	▪ Environmental weeds controlled at reintroduction sites.	DSE South West Private
14. Monitor and control native animals to reduce grazing.	▪ Mammalian grazing pressure managed to maintain habitat quality for Eastern Barred Bandicoots.	DSE South West, Private

15. Develop site management protocols. Analyse of existing data to evaluate and refine current site management procedures. Analyse existing data to investigate influences of environmental parameters such as climate, predator activity, grazing impacts and vegetation structure on population densities at each reintroduction site.	▪ Current management procedures evaluated and refined by analysing existing data. ▪ Existing data analysed to investigate influences of environmental parameters on population densities at each reintroduction site. ▪ Site management protocols developed and refined as necessary.	DSE South West
16. Further investigate the genetic implications of the small size of the mainland Eastern Barred Bandicoot population.	▪ Genetic surveys completed of entire population. ▪ Possibility of interbreeding with Tasmanian Eastern Barred Bandicoots investigated.	DSE

Objective III Maintain captive populations.

Action	*Targets*	*Responsible*
17. Establish minimum population targets for the captive population to meet reintroduction requirements.	▪ Captive population targets set and reviewed annually based on updated reintroduction requirements.	DSE Zoos Victoria
18. Undertake captive breeding for reintroduction or reinforcement.	▪ Captive populations managed to meet captive population targets. ▪ Eastern Barred Bandicoots produced annually from captive populations for reintroduction requirements. ▪ Eastern Barred Bandicoots released from captive population in years 1 and 2. ▪ Eastern Barred Bandicoots subsequently released where required to meet recovery plan objectives.	Zoos Victoria DSE

Objective IV Maintain and enhance the level of community and agency support for Eastern Barred Bandicoot recovery.

Action	*Targets*	*Responsible*
19. Develop, publish and distribute educational, technical or publicity material and/or displays.	▪ Newsletters produced and published to inform community and other stakeholders of recovery progress and issues. ▪ Eastern Barred Bandicoot website maintained. ▪ Interpretation and education materials reviewed and upgraded. ▪ Ongoing support for Eastern Barred Bandicoot recovery secured.	DSE Parks Victoria
20. Identify and promote opportunities for community involvement in recovery activities.	▪ Opportunities identified and promoted.	DSE South West Parks Victoria

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