

Gilbert's Potoroo *Potorous gilbertii*

Key Findings

Gilbert's Potoroo was once locally abundant around the WA south-west coast, however declined rapidly from the mid-1800s due to predation from foxes and cats. Two insurance populations established in 2005 and 2009 prevented disaster in 2015, when an intense wildfire burnt most of the habitat of the original population. A third insurance population was established in 2017. While the original wild population declined severely following the 2015 fire, the insurance populations have improved the overall population trajectory although the species requires ongoing careful management. Photo: Gilbert's Potoroo Action Group



Significant trajectory change from 2005-15 to 2015-18?

Yes, rate of increase has improved.

Priority future actions

- Effective management and control of fire, foxes and feral cats at all sites
- Translocated insurance populations maintained
- At least three more translocation sites free of foxes and cats established

Full assessment information

Background information

1. [Conservation status and taxonomy](#)
2. [Conservation history and prospects](#)
3. [Past and current trends](#)
4. [Key threats](#)
5. [Past and current management](#)
6. [Support from the Australian Government](#)
7. [Measuring progress towards conservation](#)

2018 population trajectory assessment

8. [Expert elicitation for population trends](#)
9. [Immediate priorities from 2019](#)
10. [Contributors](#)
11. [Legislative documents](#)
12. [References](#)
13. [Citation](#)

The primary purpose of this scorecard is to assess progress against the year three targets outlined in the Australian Government's Threatened Species Strategy, including estimating the change in population trajectory of 20 mammal species. It has been prepared by experts from the **National Environmental Science Program's Threatened Species Recovery Hub**, with input from a number of taxon experts, a range of stakeholders and staff from the Office of the Threatened Species Commissioner, for the information of the Australian Government and is non-statutory. It has been informed by statutory planning documents that guide recovery of the species, such as Recovery Plans and/or Conservation Advices (see Section 11). The descriptive information in the scorecard is drawn from the summaries of (Courtenay and Friend 2004; Woinarski *et al.* 2014; WA DPW 2016) and references therein; unless otherwise noted by additional citations.

The background information aims to provide context for estimation of progress in research and management (Section 7) and estimation of population size and trajectories (Section 8).

1. Conservation status and taxonomy

Conservation status	2018
EPBC	Critically Endangered
WA	Critically Endangered

Taxonomy:

No subspecies are recognised. In the past, some authors considered Gilbert’s potoroo to be a subspecies of the long-nosed potoroo (*Potorous tridactylus*), but mitochondrial DNA sequencing has shown that it is a distinct species.

2. Conservation history and prospects

Gilbert’s Potoroo is endemic to Western Australia, where it is the only species of *Potorous*. It is the rarest marsupial in the world and has the smallest population size of any mammal in Australia. Before European settlement, its distribution apparently extended around the southwest coast of Western Australia from around Margaret River to the Albany area (Courtenay and Friend 2004). Live specimens were collected from the 1840s on, near Albany, possibly as far east as the Pallinup River, and it was considered locally abundant. However, populations appear to have declined rapidly and Gilbert’s Potoroo was not recorded from the 1870s until 1994, when it was ‘rediscovered’ on Mt Gardner, in Two Peoples Bay Nature Reserve (Sinclair *et al.* 1996). Here, it was living in small groups within several patches of dense, long-unburnt heathland within the 47 km² reserve. Gilbert’s Potoroo diet is almost totally made up of fungi, which it digs up from the ground.

Given the precarious status of the single, small Mt Gardner population, the WA government established two insurance populations, one on Bald Island (8 km²) with translocations of 10 animals between 2005–2007, and the second in a mainland fenced enclosure in Waychinicup National Park (3.8 km²) using mostly animals from Bald Island, with those translocations beginning in 2009 (Friend 2009; Finlayson *et al.* 2010). A captive group was also maintained for 15 years but breeding was limited and the program was ultimately unsuccessful (Stead-Richardson *et al.* 2010).

The Bald Island (8 km²) population of potoroos steadily increased to carrying capacity; the population at Waychinicup struggled to grow initially, partly due to predation by pythons, but is now stable. Mt Gardner supported 30–40 potoroos (Friend 2009) until an intense wildfire burnt most of the potoroos’ habitat in 2015. In an emergency response to this fire, the WA government captured and relocated seven potoroos. Four were later moved to Michaelmas Island (0.9 km²) as a trial, but the trial was quickly abandoned when it became clear that the small population was not viable there. A trial (and temporary) translocation of 4 animals from Bald Island to Middle Island (10.4 km²) in the Recherche Archipelago in 2017 was encouraging, and followed up by a second trial in 2018, using 10 animals (in two translocations, and again from Bald Island), in an attempt to establish another island population (T. Friend, pers. comm.).

The WA government also implemented a program to intensify control of foxes and feral cats around Mt Gardner, in an attempt to reduce predation pressure on any potoroos still extant, whilst cover regenerates (T. Friend, pers. comm.)

In 2005, the population at Mt Gardner numbered around 30. In 2015, Mt Gardner supported about 15 individuals, with 45 at Bald Island and 15 at Waychinicup. The entire population is estimated to currently be at least 100 individuals, distributed across Middle Island (10), Bald Island (70), Waychinicup (20), and Mt Gardner (2).

3. Past and current trends

Subfossil evidence from caves near Margaret River and at Yanchep north of Perth, taken with records around Albany, indicates that Gilbert’s Potoroo may have occurred in a strip along the coast between the Albany area and Margaret River, possibly extending north of Perth. However, live specimens have only ever been collected from around Albany, from the 1840s where it was locally abundant (Courtenay and Friend 2004; WA DPW 2016). John Gilbert wrote in letters to John Gould (1863) that “immense numbers” of quokkas and potoroos could be captured by Aborigines in a single afternoon (Courtenay and Friend 2004). Following European settlement, Gilbert’s Potoroo declined rapidly and the last early records are from the 1870s. It was believed extinct until a small population was rediscovered on Mt Gardner in 1994 (Sinclair *et al.* 1996). That population was thought to number less than 40 animals, given the extent of habitat available (Friend 2009).

Following a large wildfire on Mt Gardner in 2015, this original wild population (about 15 at that stage; T. Friend, pers. comm.) was severely reduced; 7 surviving animals were captured for rescue and translocation. The translocated populations at Bald Island and Waychinicup are both still extant, with about 70 animals on Bald Island and about 20 in Waychinicup. Ten potoroos were introduced to Middle Island in 2018. Overall, 103 individuals are known to be alive (T. Friend, pers. comm.).

Thus although the original, wild population at Mt Gardner has declined, the overall population has increased between 2015 and 2018 because of new translocations and an increase in the Bald Island population.

Monitoring (existing programs):

The WA Department of Biodiversity, Conservation and Attractions (DBCA) undertake regular monitoring of Gilbert’s Potoroo (as summarised in Table 1). The information in this table was provided by the contributors listed at the end of the document. The population trends are tracked using the minimum ‘Known-To-Be-Alive’.

Table 1. Monitoring activity for Gilbert’s Potoroo.

MONITORING ACTIVITY				
Method	Undertaken by	Year/s	Location	Contributors and partners
Population monitoring by regular trapping program (four-monthly)	DBCA, GPAG*, other community volunteers	Ongoing since 1994	Two Peoples Bay	DBCA in kind, DBCA, South Coast NRM
Population monitoring by regular trapping program (four-monthly)	DBCA, GPAG, community volunteers	Ongoing since 2010	Waychinicup NP enclosure	DBCA in kind, DBCA, TSRF
Population monitoring by regular trapping program (annual)	DBCA, GPAG, community volunteers	Ongoing since 2005	Bald Island	DBCA in kind, DBCA, TSRF
Population monitoring by regular trapping program (four-monthly)	DBCA, GPAG, community volunteers	Ongoing since 2017	Middle Island	DBCA in kind, DBCA, TSRF, GPAG
Monitoring predation of individuals through temporary radio-marking	DBCA	Ongoing since 2015	Two Peoples Bay, Waychinicup NP enclosure	DBCA

*Gilbert’s Potoroo Action Group

Population trends:

Tables 2 and 3 summarise the overall trend and status of Gilbert’s Potoroo. The information provided in these tables is derived from the recovery plan, conservation advices and the 2012 Mammal Action Plan with some amendments made by contributing experts based on new information.

Table 2. Summary of the available information on Gilbert’s Potoroo distribution and population size, and (where possible) trend estimates between 2015 and 2018 for each parameter.

Population parameters	Published baseline	2015 Estimate	2018 estimate	Confidence in estimates
Extent of Occurrence	10 km ²	> 22 km ²	> 32 km ²	High
Area of Occupancy	<10km ²	22 km ²	32 km ²	High
Dates of records and methods used		As per Mammal Action Plan		
Generation time	3-4	n/a	n/a	Moderate-High (as in MAP)
WILD* (includes all free-living populations within enclosures and on islands)				
No. mature individuals	100	75	103 known to be alive	High
No. of subpopulations	1	1	1	High
No. of locations	2	3	5	High
EXCLOSURES/ISLANDS				
No. mature individuals	n/a	60 known to be alive	101 known to be alive	
No. subpopulations	n/a	1	1	Locations are managed as 1 meta-pop
No. locations	n/a	1	4	
No. mature individuals	While the captive facility was used to hold animals temporarily after the fire, no attempt was made to breed them and they were soon released back to the wild			

*Including translocations

Table 3. Estimated recent (2005-2015) and current (2015-2018) population trends for Gilbert’s Potoroo.

Sub-population	Est. % of total pop’n (pre-2015)	2005-2015 trend	Confidence in 2005-2015 trend	2015-2018 trend	Confidence in 2015-2018 trend	Est. % of total pop’n (2018)	Details
Bald Island Nature Reserve	60 %		High		High	70% (70 indivs)	Population estimate of 45 mature individuals in 2015, (and was estimated increase to 70 mature individuals by 2017).
Waychinicup National Park Enclosure	20 %		High		High	20%	15 individuals in 2015, 20 individuals in 2018.
Mt Gardner	20 % (15 indivs) (c. 30 in 2005)		High		High	2% (2 indivs known to be alive)	After 2015 fire, 7 animals were relocated due to lack of resources to sustain them. (Note that 2016 Rec Plan says 6 were removed)
Middle Island	0	n/a	n/a		High	10%	A new population of 10 individuals was established in 2018. It is estimated that Middle Island could support 30+ individuals by 2025.
Whole population	100 (75 indivs) (2005 = 30 indivs)		High		High	100 (100 indivs)	The Mt Gardner population has declined, but this decline has been compensated by increases in the number of individuals on islands/within the fenced area

KEY:

Improving	Stable	Deteriorating	Unknown

Confidence	Description
High	Trend documented
Medium	Trend considered likely based on documentation
Low	Trend suspected but evidence indirect or equivocal

4. Key threats

The threats listed here are drawn from the latest Recovery Plan (WA DPW 2016). Note that this is not a list of all plausible threats, but a subset of the threats that are likely to have the largest impact on populations.

Inappropriate fire regimes

A major fire caused by a lightning storm burnt through potoroo habitat on Mt Gardner in November 2015, removing most of the dense heath habitat favoured by potoroos, and causing the loss of most of the population. Once the habitat regenerates and potoroos recover here, the increasing likelihood of bushfires in a drying climate will continue to threaten this population.

Predation by red foxes and feral cats

Gilbert's Potoroo is within the critical weight range of mammals that are most susceptible to predation by foxes and feral cats. Both of these predators are known to occur in the Two Peoples Bay area, though fox baiting has occurred since 1988 (rediscovery of this species followed fox baiting). These predators are absent from Bald Island, Middle Island and within the enclosure at Waychinicup National Park, but if they were to invade these areas (and were not immediately detected and eradicated) they could cause a major reduction in population size.

Climate change

A drying climate will affect the prevailing fire patterns, and may also affect the availability of fungi for the potoroo.

The impacts of the major threats are summarised in Table 4.

Table 4. The major threats facing the Gilbert's Potoroo and their associated impact scores.

CURRENT THREAT IMPACT			
Threat	Timing	Extent	Severity
1. Increase in fire frequency/intensity	Continuing/ongoing	50-90% of range	50-100%
2. Foxes	Continuing/ongoing	1-50% of range	50-100%
3. Feral cats	Continuing/ongoing	1-50% of range	50-100%
4. Climate change	Distant future	>90% of range	Not negligible but <20

Timing: continuing/ongoing; near future: any occurrence probable within one generation (includes former threat no longer causing impact but could readily recur); distant future: any occurrence likely to be further than one generation into the future (includes former threat no longer causing impact and unlikely to recur).

Extent: <1% of range; 1-50%; 50-90%; >90%.

Severity: (over three generations or 10 years, whichever is longer) Causing no decline; Negligible declines (<1%); Not negligible but <20%; 20-29%; 30-49%; 50-100%; Causing/could cause order of magnitude fluctuations.

5. Past and current management

Recent and current management actions that support the conservation of Gilbert’s Potoroo are summarised in Table 5. The information has been provided by contributors.

A WA Recovery Plan (2016) and Conservation Advice (2016) are in place, guiding recovery action (see Section 11).

Table 5. Management actions thought to be contributing to the conservation of the Gilbert’s Potoroo.

Action	Location	Timing	Est. % population	Contributors and partners
Translocation to predator-free islands or mainland fenced areas (and maintenance of Waychinicup enclosure)	Bald Island Waychinicup	From 2005 ongoing	>90% of entire population by 2018	DBCA
Establishment of captive breeding colony.	Near Mt Gardner	Began 1994, ended 2010	n/a	DBCA
Emergency poison-baiting around Mt Gardner post 2015 fire.	Mt Gardner	2015-ongoing	20%	DBCA
Emergency relocation of 7 survivors of the 2015 fire.	Mt Gardner	2015	10%	DBCA
Experimental release on Michaelmas island	Michaelmas Island	2016		DBCA
Establish new population (10 individuals at present, and estimated to support 30+ individuals by 2025)	Middle Island			DBCA and GPAG (with support from the Australian Government Threatened Species Recovery Fund)
Fox and feral cat control by monthly baiting and cat-trapping (TPB) or quarterly baiting (WNP)	Two Peoples Bay Waychinicup NP	Ongoing		DBCA
Fire management and preparedness to minimise the risk of catastrophic bushfire (reducing risk of catastrophic bushfire)	Waychinicup NP	Ongoing		DBCA
Awareness raising in community regarding potoroo recovery	Western Australia	Ongoing		GPAG and DBCA

6. Actions undertaken or supported by the Australian Government resulting from inclusion in the Threatened Species Strategy

The Australian Government provided \$250,000 from the Threatened Species Recovery Fund over 18 months (2017-2018) to establishing a new population of Gilbert’s Potoroo on Middle Island. The Australian Government also provided \$1.7 million towards feral cat control in Western Australia; this contributed to protection for this species (and many others).

7. Measuring progress towards conservation

Table 5. Progress towards management understanding and management implementation for each of the major threats affecting Gilbert’s Potoroo in 2015 (i.e. timing of TSS implementation) and 2018, using the progress framework developed by Garnett *et al.* (2018).

PROGRESS IN MANAGING THREATS			
Threat	Year	Understanding of how to manage threat	Extent to which threat being managed
1. Increase in fire frequency/intensity	2015	2. Research has provided strong direction on how to manage threat	2. Work has been initiated to roll out solutions where threat applies across the taxon’s range
	2018	2. Research has provided strong direction on how to manage threat	2. Work has been initiated to roll out solutions where threat applies across the taxon’s range
2. Red foxes	2015	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
3. Feral cats	2015	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
	2018	6. Research complete and being applied OR ongoing research associated with adaptive management of threat	4. Solutions are enabling achievement but only with continued conservation intervention
4. Climate change	2015	2. Research has provided strong direction on how to manage threat	0. No management
	2018	2. Research has provided strong direction on how to manage threat	0. No management

> Green shading indicates an improvement in our understanding or management of threats between years 2015 and 2018, while red shading indicates deterioration in our understanding or management of threats.

KEY:

Score	Understanding of how to manage threat	Extent to which threat is being managed
0	No knowledge and no research	No management
1	Research being undertaken or completed but limited understanding on how to manage threat	Management limited to trials
2	Research has provided strong direction on how to manage threat	Work has been initiated to roll out solutions where threat applies across the taxon’s range
3	Solutions being trialled but work only initiated recently	Solutions have been adopted but too early to demonstrate success
4	Trial management under way but not yet clear evidence that it can deliver objectives	Solutions are enabling achievement but only with continued conservation intervention
5	Trial management is providing clear evidence that it can deliver objectives	Good evidence available that solutions are enabling achievement with little or no conservation intervention
6	Research complete and being applied OR ongoing research associated with adaptive management of threat	The threat no longer needs management

8. Expert elicitation for population trends

An expert elicitation process was undertaken to assess population trends for the period 2005-2015 and post-2015 under the following management scenarios. Please note that differences between Management Scenarios 2 and 3 (Fig. 1) are difficult to attribute, as it can be difficult to determine whether actions undertaken after 2015 were influenced by the Threatened Species Strategy or were independent of it (see Summary Report for details of methods).

Management Scenario 1 (red line): *no conservation management undertaken since 2015, and no new actions implemented.*

- No fire management to reduce the risk of fire affecting an entire location
- No control for foxes
- No control for cats
- No emergency response to Mt Gardner fire in 2015 (e.g. no translocation to Middle Is.)
- No maintenance of Waychinicup and Bald Island

Management Scenario 2 (blue line): *continuation of existing conservation management (i.e. actions undertaken before implementation of the Threatened Species Strategy or independent of the Threatened Species Strategy).*

- Fire management in place, but success is variable, e.g. Mt Gardner location burnt in a single fire in 2015
- Long-term fox control program continues
- Cat control being trialled
- Waychinicup and Bald Island maintained

Management Scenario 3 (green line): *continuation of existing management, augmented by support mobilised by the Australian Government under the Threatened Species Strategy.*

- Fire management in place, but success is variable, e.g. Mt Gardner location burnt in a single fire in 2015
- Long-term fox control program continues.
- Cat control being trialled
- Emergency response to Mt Gardner fire in 2015 (e.g. Translocation and establishment of Middle Island population (10 individuals in 2018, estimated to support 30+ individuals in 2025))
- Waychinicup and Bald Island maintained

Overall estimated population trajectories subject to management scenarios considered

Gilbert's Potoroo is currently being managed under Scenario 3 (green line).

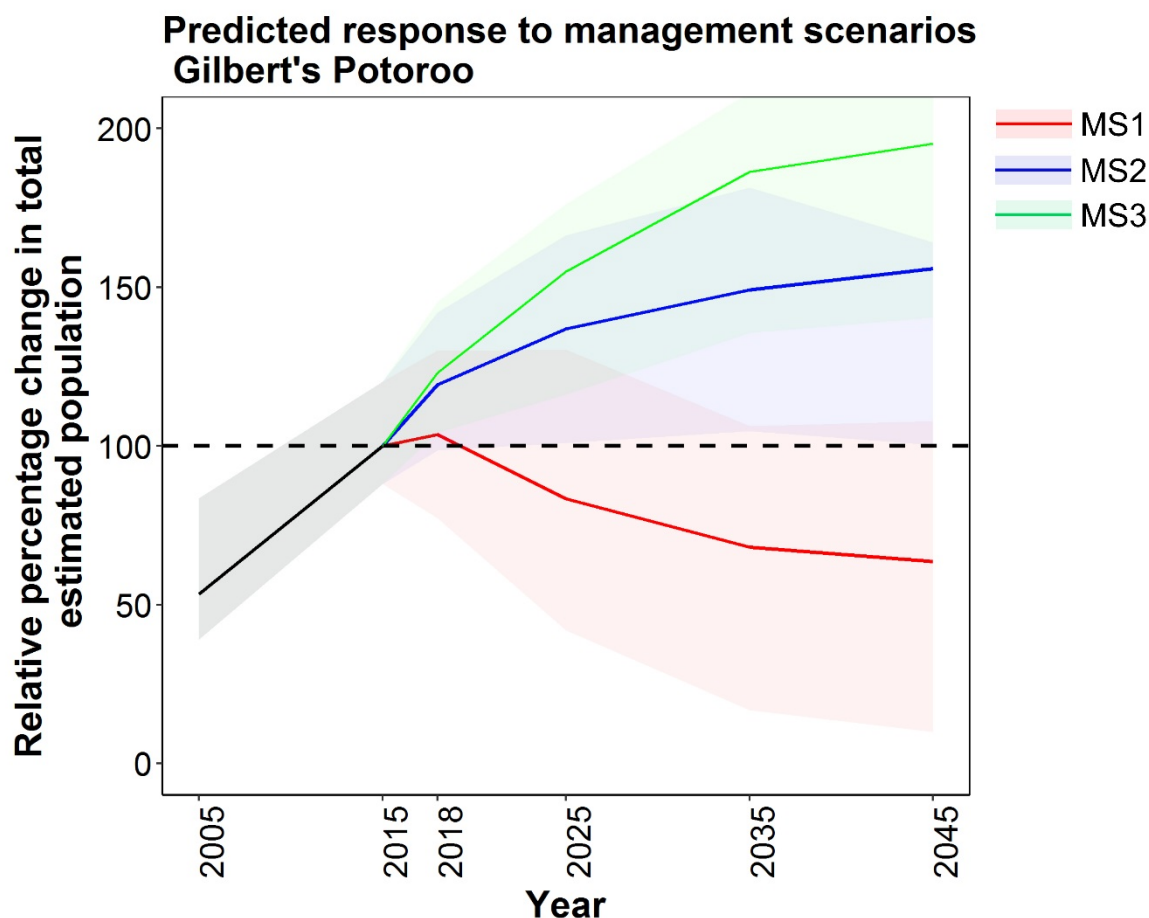



Figure 1. Estimated relative percentage change in population under each of the management scenarios described above. Data derived from 6 expert assessments of Gilbert's Potoroo expected response to management, using four-step elicitation and the IDEA protocol (Hemming et al. 2017), where experts are asked to provide best estimates, lowest and highest plausible estimates, and an associated level of confidence. The dashed line represents the baseline value (i.e. as at 2015, standardised to 100). Values above this line indicate a relative increase in population size, while values below this line indicate a relative decrease in population size. Shading indicates confidence bounds (i.e. the lowest and highest plausible estimates).

Population size projections based on expert elicitation are extended here to 2025, 2035 and 2045 (i.e. 10, 20 and 30 years after the establishment of the Threatened Species Strategy) on the grounds that some priority conservation management actions may take many years to achieve substantial conservation outcomes. However, we note also that there will be greater uncertainty around estimates of population size into the more distant future because, for example, novel threats may affect the species, managers may develop new and more efficient conservation options, and the impacts of climate change may be challenging to predict.

Improved trajectory (Threatened Species Strategy Year 3 target):

The primary purpose of this scorecard is to assess progress against achieving the year three targets outlined in the Australian Government’s Threatened Species Strategy, i.e. a demonstrated improved trajectory for at least half of the priority species (10 birds and 10 mammals). To assess this, we first use the expert-derived trend between 2005-15 (i.e. 10 years prior to implementation of the TSS) as a baseline for assessing whether there has been an improvement in trajectory in the time since implementation of the TSS (i.e. 2015-18). Table 6 below summarises this information, where negative values indicate a declining population, and positive values indicate an increasing population. We used Wilcoxon match-paired tests to compare trajectories for these two periods; a significant result (probability <0.05) indicates that there was a high concordance amongst experts that their trajectory estimates for 2005-15 were different to their estimates for 2015-18.

Table 7. A comparison of the relative annual percentage population change for the periods 2005-2015 and 2015-2018.

	Pre-TSS trend (2005-2015)	Post-TSS trend (2015-2018)	Year 3 target met?	Significant concordance among elicitors?
Annual percentage population change	4.7	7.7		Elicitors showed high level of consistency in estimating improved trajectory from the period 2005-15 to 2015-18

The key investment from the Australian Government directed specifically to this species was contributing to the creation of a new island population of Gilbert’s Potoroos on Middle Island. The benefits of this investment will be realised in the next 10 or so years. Through the Threatened Species Strategy, the Australian Government also contributed to general improvements in cat control, and this will help support the recovery of the unfenced population at Mt Gardener in the next 10-20 years.

Additional actions that could improve trajectory

The potential impact of carrying out specific additional conservation measures on the population trajectory of Gilbert’s Potoroo was also evaluated through expert elicitation. Additional actions that could further improve the population trajectory of Gilbert’s Potoroo include:

- Fire management in place that is effective at preventing fire affecting entire locations
- Fox control program continues
- Cat control is effective and ongoing
- Emergency response to Mt Gardner fire in 2015 (e.g. Translocation and establishment of Middle Island population (10 individuals in 2018, estimated to support 30+ individuals in 2025)
- Waychinicup, Middle Is and Bald Island maintained
- At least three more translocation sites free of foxes and cats established, and translocated populations thrive. These are likely to be fenced, as no or few additional islands are available.

9. Immediate priorities from 2019

The state adopted recovery plan (WA DPW 2016) is current and reflects the most up-to-date management requirements for this species. Most actions specified are being implemented.

Data collection:

- Monitor recovery of vegetation at Mt Gardner to assess when potoroos can be returned to that site
- Continue to monitor status and trends of all extant populations.
- Evaluate longer term viability of Waychinicup population, and adapt management.
- Assess effectiveness of cat and fox control at reducing predator densities and enhancing potoroo survival
- Genetic assessment of all populations to inform future management of meta-population
- Investigate habitat use, impacts of climate change on food resources, and causes of mortality in Gilbert's potoroos
- Develop molecular tools to understand dietary complexity in Gilbert's potoroo.

Management actions:

- Develop fire management strategies to prevent fire from affecting entire locations in the future
- Maintain fox and feral cat baiting programs on Mount Gardner, Two Peoples Bay Nature Reserve, and continue to ensure the predators absence on Bald Island and within the enclosure in Waychinicup National Park
- Monitor and support the translocation to Middle Island
- Maintain emergency captive breeding facility
- Select and prepare another mainland translocation site and implement and monitor a new translocation
- Develop translocation plan, including:
 - identification and selection of at least two new release sites
 - protocols for monitoring source/translocated subpopulations
 - strategies to maintain or improve genetic diversity in all subpopulations

10. Contributors

Sarah Legge, John Woinarski, Stephen Garnett, Hayley Geyle (NESP TSR Hub); Tony Friend, Manda Page (WA DBCA); Andrew Burbidge; Nicholas MacGregor.

11. Legislative documents

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13. Citation

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