

Golden Bandicoot *Isoodon auratus*

Key Findings

Golden Bandicoots were previously widespread across mainland Australia, but now occur only near coastal areas and islands of north and north-west Australia, following declines due to predation by feral cats and foxes and altered fire regimes. Recovery efforts have focused on maintaining Golden Bandicoots in protected areas through predator control and appropriate fire management. Translocations to predator-free sites, including islands, have also been successful. Photo: Judy Dunlop



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

No, populations stable or increasing slightly, with no significant change in trajectory over the periods 2005-15 to 2015-18.

Priority future actions

- More translocations to large enclosures and cat-free islands.
- Effective fire and feral cat management at all sites

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 this scorecard is drawn from published sources and relevant conservation advices, complemented by advice from contributing experts.

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	Vulnerable*
NT	Endangered
WA	Vulnerable*
NSW	Presumed Extinct**
SA	Endangered

Taxonomy:

The taxonomy of the *Isoodon obesulus/auratus* group has been difficult to resolve. Westerman *et al.* (2012) indicated that the two species were distinct. The taxonomic status of subspecies of *I. auratus* has also been unclear. The Action Plan for Australian Mammals (Woinarski *et al.* 2014) assessed *I. auratus* as a single species with no subspecies. The two subspecies, *I. a. auratus* and *I. a. barrowensis*, are listed separately under the EPBC Act.

Hereon, this scorecard refers to the Golden Bandicoot at the species level, i.e. *I. auratus*.

* Not listed at species level, but both subspecies listed as Vulnerable.

** for *I. a. auratus*

2. Conservation history and prospects

The Golden Bandicoot had an extensive distribution across most of the continent at the time of European settlement, but has disappeared from >95% of this range subsequently, and now occurs only on a small area of the Kimberley mainland, four islands off the Kimberley (Lachlan (12 km²), Augustus (190 km²), Storr (19 km²) and Uwins (33 km²)) (Gibson and McKenzie 2012), four islands off the Pilbara (Barrow (235 km²) and the adjacent and partly-connected Boomerang (0.05 km²), Middle (3.5 km²), Hermite (10 km²) and Doole (2.6 km²)), with the latter an assisted colonisation (Burbidge and Abbott 2017); and Marchinbar (210 km²), Raragala and Guluwuru Islands off north-eastern Arnhem Land (with subpopulations in the latter two islands resulting from recent translocations) (Woinarski *et al.* 1999). It was extirpated from Hermite Island (10 km²) in the early 1900s, but was reintroduced there from Barrow Island in 2010 (Burbidge 1999; Burbidge and Fuller 1998; Morris *et al.* 2015) and also occurs on the adjacent and partly-connected Buttercup Island (0.1 km²). It was also translocated to an 11,100 ha introduced predator-free enclosure at Matuwa in 2010 with trial releases outside of the enclosure underway (K. Morris *pers. comm.*).

Its last confirmed record from mainland Northern Territory was in 1967 (Parker 1973). It has disappeared from many conservation reserves, including Kakadu National Park (Woinarski and Winderlich 2014).

There is information on current trends for some of the WA Pilbara island populations and within the enclosure at Matuwa. The Barrow Island population fluctuates between 25,000 and 35,000 individuals depending on rainfall. The translocated populations on Hermite and Doole Islands have increased since 2010 and likely number 4,100 and ca. 200 respectively (K. Morris *pers comm.*). The population inside the enclosure at Matuwa has doubled since 2010, to approximately 350 individuals. There is evidence of persistence outside the enclosure at Matuwa. There is no monitoring of Kimberley islands or mainland populations.

The most likely cause of decline and most significant threat is predation by feral cats. Feral cats were responsible for the extinction of Golden Bandicoots on Hermite Island and for the demise of an experimental reintroduced population in the Gibson Desert (Christensen and Burrows 1994). This threat operated pervasively across mainland populations (including conservation reserves), although cat densities may be relatively low and impacts relatively minor in rugged areas of the north Kimberley (Hohnen *et al.* 2016), where the Golden Bandicoot still occurs. However, such areas may not provide assured security as Golden Bandicoots were extirpated in rugged areas of Arnhem Land. Feral cats are currently absent from all islands on which Golden Bandicoots persist, and their prospects may be contingent on adequate biosecurity arrangements that retain the cat-free status of these islands. There have been successful reintroductions to a predator-proof enclosure at Matuwa WA in part of its former range (Morris *et al.* 2015; Sims *et al.* 2017).

3. Past and current trends

The Golden Bandicoot declined severely across mainland Australia from the mid-nineteenth century, with declines exhibited later in more northern areas (Burbidge *et al.* 1988; McKenzie 1981); it was also extirpated from some islands to which cats were introduced, notably Hermite Island in the Montebello group (Burbidge *et al.* 2000). Populations on most islands (all now cat-free) may be relatively stable. Re-introductions to a predator-proof enclosure (Matuwa) have been successful, with population increases, with some establishment in intensively cat-baited areas adjacent to that enclosure (Morris *et al.* 2015; Sims *et al.* 2017).

Monitoring (existing programs):

- Annual monitoring of critical weight range mammals in North Kimberley – Elliott, cage and remote camera traps (2011-2018, undertaken by DBCA)
- Annual monitoring of Barrow Island population (2010 – ongoing, undertaken by Chevron)
- Triennial monitoring of Doole and Hemite Island (2010 – ongoing, undertaken by WA DBCA)
- Annual monitoring of Matuwa enclosure using standardised line transect trapping and 2 ha track plot methodology (2010 – ongoing, undertaken by DBCA and Martu Rangers).
- Live-trapping survey conducted in 2016 on Marchinbar and Raragala Islands (undertaken by the NT DENR and Marthakal Rangers)
- Camera trapping, live trapping and genetic analysis at Yampi in 2017-2018 (undertaken by AWC with funding from the Department of Defence).
- Camera and live trapping and genetic analysis over Dambimangari IPA (2018 onwards) and Charnley River Wildlife Sanctuary (2018 onwards)
- As of 2018, MKK Rangers (with support from the Australian Govt. – \$50K p.a.) are monitoring the translocated population of Golden Bandicoots outside the Matuwa enclosure (ongoing until 2023) to find out about their behaviours and preferred habitat.

Future monitoring activities (2018-2019) will assess the effectiveness of fire management in the Dambimangari and Unguu Indigenous Protected Areas and the effectiveness of “Felixer” (a robotic grooming trap for cats) at managing cat populations in areas of high conservation value (in the north-west Kimberley region) (undertaken by Dambimangari and Unguu Rangers with support from WWF, AWC and BHA).

Threatened Species Strategy – Year 3 Priority Species Scorecard (2018)

Population trends:

Tables 1 and 2 summarise the overall trend and status of the Golden Bandicoot. The information provided in these tables is derived from the recovery plan and conservation advices with some amendments made by contributing experts based on new information.

Table 1. Summary of the available information on Golden Bandicoot 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
WILD*				
Extent of Occurrence	135,000 km ²	135,000 km ²	135,000 km ²	Medium (may increase in near future if reintroduction to Newhaven is successful)
Area of Occupancy	1800 km ²	1800 km ²	1800 km ²	Medium
Dates of records and methods used			As per Mammal Action Plan	
No. mature individuals	100,000	60,000	60,000	Low (trajectories poorly resolved in many populations, but some notable increases)
Any other measure of relative abundance		<p>2009: 0.2-0.7 trap success across DBCA Kimberley sandstone sites</p> <p>2000-2008: 25-35% trap success on Barrow Island Grids</p> <p>1991: 21-35% trap success on Middle Island after successful black rat eradication</p>	0.6-1.2% trap success across DBCA Kimberley Sandstone sites	
No. of subpopulations	12	12	12	Medium (increase due to translocations)
No. of locations	12	12	12	Medium (increase due to translocations)
Generation time	2	n/a	n/a	Medium (as per MAP)
EXCLOSURES				
No. mature individuals	0	50	350	Medium (Matuwa popn securely established)
No. locations	0	1	1	Medium (Matuwa popn securely established)
CAPTIVE BREEDING				
No. mature individuals	0	0	?	
No. locations	0	0	1	Alice Springs Desert Park

*Including translocations

Table 2. Estimated recent (2005-2015) and current (2015-2018) population trends for the Golden Bandicoot.

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	Details
Marchinbar Island (Wessel group)	2%	?	n/a	?	n/a	Limited monitoring probably not yet sufficiently intensive to demonstrate trends reliably
Raragala Island (Wessel group)	<1%		medium	?	n/a	Recent translocations
Guluwuru Island (Wessel group)	<<1%		medium	?	n/a	Recent translocations
North Kimberley mainland	35%		medium		low	Limited monitoring data to date, with appropriate sampling methodologies being determined (hair traps, sensor cameras, trapping)
Augustus Island	5%		low		low	A survey was conducted this year by Dambimangari Rangers, AWC and WWF. Data are retained by Dambimangari Rangers.
Lachlan Island	1%		low		low	
Storr	1%		low		low	
Uwins Island	2%		low		low	
Barrow Island	50%		high		high	Popn size of ca. 75,000 (Short & Turner 1994); current more robust estimates are 25,000 to 35,000 (K. Morris <i>pers. comm.</i>)
Middle Island	2%		low		low	
Hermite Island	1-5%		low		high	Population estimate of ca. 4000 (K. Morris <i>pers. comm.</i>)
Doole Island	<1%		high		high	Population estimate of ca. 200 (K. Morris <i>pers. comm.</i>)
Matuwa	1%		high		high	Population estimate of ca. 350 (K. Morris <i>pers. comm.</i>)
Whole population	100		low		medium	

KEY:

Improving	Stable	Deteriorating	Unknown
			?

Confidence	Description
High	Trend documented

4. Key threats

The threats listed here are derived from conservation advices, and contributions from consulted experts based on new information. 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.

Invasive non-native species: Predation by feral cats *Felis catus*

The decline of Golden Bandicoots on the mainland is likely due mostly to introduced predators – foxes and feral cats in arid and semi-arid parts of their former range, and feral cats in the monsoonal tropics. Cats were also implicated in the extinction of Golden Bandicoots on Hermite Island. The greatest threat to the island populations in both the NT and WA is the deliberate or inadvertent introduction of cats.

The impacts of feral cats may be magnified by fire, with cats known to be attracted to, and hunt more efficiently in, areas subject to recent extensive fire (Leahy *et al.* 2016; McGregor *et al.* 2014), and fire may render bandicoots more susceptible to predation because it reduces the cover provided by ground vegetation and the abundance of hollow logs.

Increase in fire frequency/intensity: inappropriate fire regimes

Golden Bandicoots may have particular sensitivities and preferences for fire regimes, as these may influence food and shelter resources and the abundance and hunting efficiencies of predators. Some small patchy fires may be beneficial for increasing habitat and food resource diversity, and reducing risks of extensive fire (Southgate *et al.* 1996). However, there is little evidence about responses to fire, and one study on Barrow Island indicated that this species may not benefit from small-scale mosaic burning (Short and Turner 1994). Rugged topography may provide some protection from extensive fire in parts of the Kimberley.

Biosecurity

In addition to the listed threats above, there is an ongoing risk of introduction of pest animals or disease to some island populations. This risk needs to be managed through the establishment of enhanced biosecurity and quarantine protocols. The effective biosecurity procedures and plans now in place on Barrow Island provide a notable example for managing this risk (K. Morris *pers. comm.*).

The impacts of the major threats are summarised in Table 3.

Table 3. The major threats facing the Golden Bandicoot and their associated impact scores.

CURRENT THREAT IMPACT			
Threat	Timing	Extent	Severity
1. Increase in fire frequency/intensity	Continuing/ongoing	50-90% of range	Not negligible but <20%
2. Predation by feral cats	Continuing/ongoing	1-50% of range	20-29%

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 Golden Bandicoots are summarised below in Table 4. A multi-species recovery plan was in place for this species (and the golden-backed tree-rat *Mesembriomys macrurus*), however it ceased to be in effect under the EPBC Act in 2015. Conservation advices that guide recovery action are in effect for the two subspecies *I. a. barrowensis* and *I. a. auratus*, see Section 11.

Table 4. Management actions directed specifically towards the conservation of the Golden Bandicoot.

Action	Location	Timing	Est. % pop'n	Contributors and partners
Develop and implement cooperative management arrangements between relevant agencies, land managers and owners (better fire and herbivore management)	Kimberley	2005-ongoing		DBCA; pastoralists; WWF; Australian Wildlife Conservancy (AWC); Bush Heritage Australia (BHA); Wiliggan (Wungurr), Uunguu and Dambimangari Traditional Owners and Rangers
Assisted colonisation & re-introduction to islands	Raragala, Guluwuru, Doole, Hermite Islands	2010 - 2011 for Hermite and Doole Is	2%	WA DBCA; NT DENR; Marthakal Indigenous Ranger group
Reintroduction of 78 males and 82 females (sourced from Barrow Island) to predator-free enclosure on mainland (Matuwa), with predator control in adjacent areas. Breeding inside the fence was successful, allowing recruitment of new individuals for trial relocation outside the fence.	Matuwa Kurrara Kurrara Indigenous Protected Area	2010-onwards	2%	WA DBCA; MKK Rangers with support from Australian Government (2018-onwards DBCA have started working with MKK Rangers as part of the new five year two-way science plan)
Eradication of feral dogs (undertaken pre-2015)	Marchinbar Island		1%	NT DENR; Marthakal Indigenous Ranger group
Fire management	Marchinbar, Raragala and Guluwuru Islands; Matuwa IPA	2014 ongoing at Matuwa		NT DENR; Marthakal Indigenous Ranger group; DBCA, Martu rangers
Fire management activities protecting key habitat and enhancing habitat in Indigenous Protected Areas (IPAs).	North-west Kimberley (Dambimangari and Uunguu IPAs)	2018 onwards		WWF; support from Threatened Species Recovery Fund (TSRF); Dambimangari Aboriginal Corporation (DAC) and Wunambal Gaambera Aboriginal Corporation (WGAC) – significant in-kind support; support also provided by BHA and AWC ecologists

Threatened Species Strategy – Year 3 Priority Species Scorecard (2018)

Implement fire management to reduce incidence of late dry season fire	Yampi	2017-2018		AWC; Department of Defence
Fire management to reduce the average size of fires, reduce the total area burnt each year, increase seral diversity, and protect sensitive areas from fire.	Matuwa MKK IPA	2015-onwards	2%	WA DBCA; MKK Rangers
Testing Felixer as techniques to manage cats in high conservation value areas containing populations of the Golden Bandicoot	North-west Kimberley (Uunguu IPA)	2019		WWF; support from TSRF; DAC and WGAC – significant in-kind support; Support also provided by BHA and WWF ecologists
Locating new populations on mainland offshore islands in the north-west Kimberley	North-west Kimberley (Dambimangari and Uunguu IPAs)	2018-2019		WWF; support from TSRF; DAC and WGAC – significant in-kind support; support also provided by BHA, WWF and AWC ecologists.
Eradication of black rats	Middle Island, Hermite Island	1990-2010		DBCA; Chevron
Eradication of feral cats	Hermite Island	1990-2010		DBCA; Chevron
Quarantine management system implemented (Barrow Is), biosecurity awareness of public using islands populations	Barrow Island; Hermite, Middle, and Doole Islands	1990-2010, ongoing		DBCA; Chevron
Reduce densities of feral herbivores	Yampi	2017-2018		AWC; Department of Defence
Genetic analysis with the aim of developing a field method for distinguishing between Golden Bandicoots and northern brown bandicoots in the field (key constraint in monitoring the Golden Bandicoot in the Kimberley, as it is difficult to distinguish on morphological characteristics)				AWC; WA DBCA

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

Two partnership projects likely to benefit the Golden Bandicoot are supported by the Australian Government:

- i. The “creating one of Australia’s largest fenced feral cat and fox free areas” project (\$750,000 of contributions from the Australian Government, partner: AWC) aims to benefit the Golden Bandicoot by providing a safe-haven (free of introduced predators) for a translocated population. Newhaven Wildlife Sanctuary (north-west of Alice Springs) will become one of Australia's largest fenced feral cat and fox-free areas. The two-stage project will establish a 100,000 hectare enclosure to protect at least nine threatened mammals, including the Golden Bandicoot. The project will be delivered in collaboration with traditional owners, with Indigenous rangers helping to control feral animals, manage fire and carry out biological surveys. The first fenced area of 9,450 ha has been constructed, with feral eradication underway (<http://www.australianwildlife.org/field-updates/2018/worlds-longest-cat-proof-fence-completed-at-newhaven.aspx>).
- ii. The project, “Preserving Australia’s Ark” in the Kimberley (\$205,120 of contributions from the Australian Government, partner: WWF) supports the work of Indigenous Rangers in the Dambimangari and Unguu Indigenous Protected Areas, including mainland hotspots (Mitchell Plateau and Yampi Peninsula) and offshore islands (Augustus, Storr and Uwins Island, and other islands with similar habitats) to undertake action such as reducing the threat of wildfire and enhancing habitat with fire; identifying and controlling feral cats around key populations; managing impacts of feral cattle; and maintaining island biosecurity to protect and manage mammals such as the Golden Bandicoot. (<http://www.nrm.gov.au/national/threatened-species-recovery-fund>).

Other Australian Government support for the Golden Bandicoot includes providing \$250,000 to the Martu Traditional Owners in WA to assist in the re-introduction of up to six threatened mammals and feral cat control; and \$249,500 to the WA Department of Parks and Wildlife for feral cat control in the Ningaloo Coast World Heritage Area.

7. Measuring progress towards conservation

Table 5. Progress towards management understanding and management implementation for each of the major threats affecting the Golden Bandicoot in 2015 (i.e. timing of TSS implementation) and 2018, based on 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	1. Research being undertaken or completed but limited understanding on how to manage threat	2. Work has been initiated to roll out solutions where threat applies across the taxon's range
	2018	1. Research being undertaken or completed but limited understanding on how to manage threat	2. Work has been initiated to roll out solutions where threat applies across the taxon's range
2. Predation by feral cats	2015	4. Trial management under way but not yet clear evidence that it can deliver objectives	4. Solutions are enabling achievement but only with continued conservation intervention**
	2018	4. Trial management under way but not yet clear evidence that it can deliver objectives*	4. Solutions are enabling achievement but only with continued conservation intervention

* Research has not yet demonstrated mechanism to control feral cats effectively in open landscapes of monsoonal Australia, although more effective management of fire and feral stock may contribute to reducing the impacts of feral cats in this region.

** Predator-proof enclosures and translocations to cat-free islands have been demonstrated to be successful, but these may not be applicable across range.

> 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 further translocations; exclosures not maintained; no management of cats or fires at all sites

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).*

- Existing translocations and those in progress maintained; control of introduced predators at some sites

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

- Further translocations enacted, including to the newly established large Newhaven exclosure.
- More substantial predator control at more sites
- Effective fire management at some sites

Overall estimated population trajectories subject to management scenarios considered

The Golden Bandicoot is currently being managed under Scenario 3 (green line).

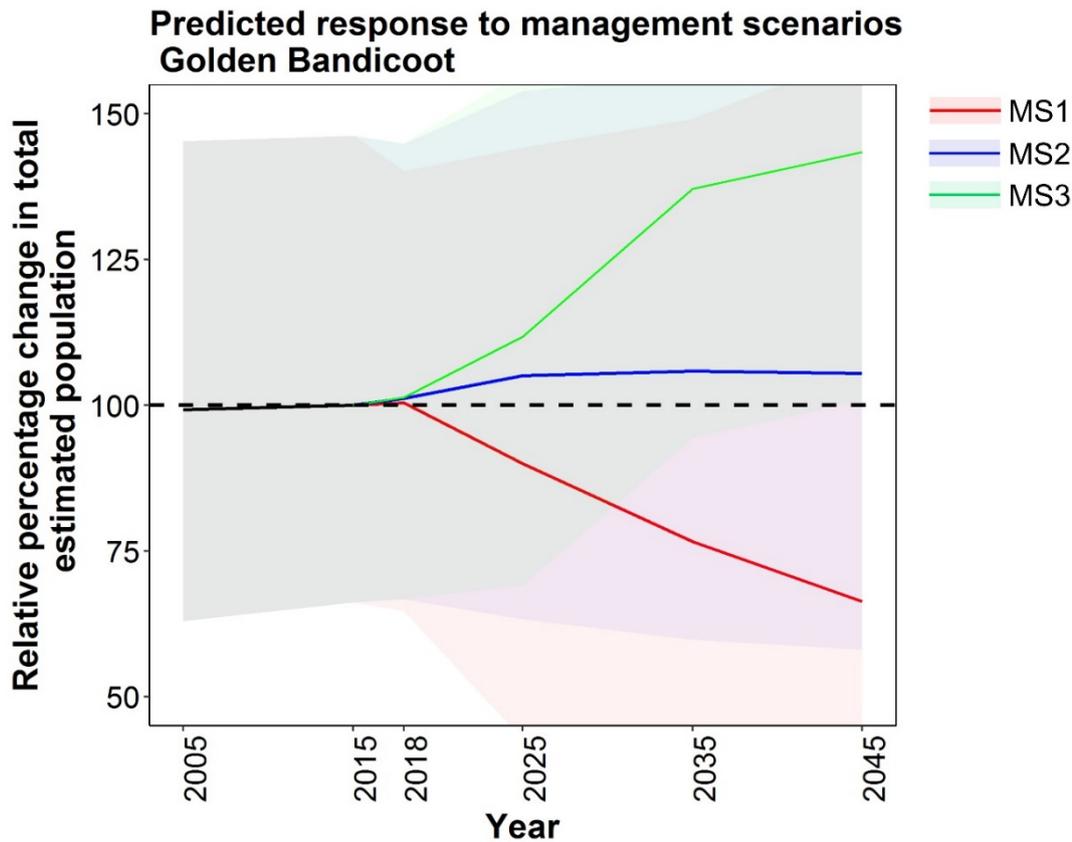


Figure 1. Estimated relative percentage change in population under each of the management scenarios described above. Data derived from 7 expert assessments of Golden Bandicoot expected response to management, using four-step elicitation and the IDEA protocol (Hemming et al. 2017), where experts are asked 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). NB: lower and upper bounds wider than shown in top graph.

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 6. 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	0.08	0.45		Elicitors were not significantly consistent in assessment of changes in trajectory from the period 2005-15 to 2015-18

The Golden Bandicoot disappeared from most of its formerly extensive range following European settlement, surviving only on some cat-free islands and in parts of the north Kimberley. However, recent trends are more positive, with new populations established and proposed as a result of reintroductions to fenced mainland sites, and translocations to islands. Most populations are now stable, and some are increasing, due to more effective management of some threats. There remain risks of new incursion of pests to some island populations, and hence need for enhanced biosecurity protocols and practices for some islands. Many stakeholders have contributed to the recent research and management effort. Commonwealth support, catalysed by the Threatened Species Strategy, has contributed to the developing establishment of a large exclosure at Newhaven, which should result in a significant increase in the population of Golden Bandicoot in the near future. Commonwealth support has also contributed to survey, management and biosecurity work by Indigenous rangers in the Kimberley.

Additional actions that could improve trajectory

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

- More translocations to large exclosures and cat-free islands.
- Effective fire management at all sites
- Effective cat management at all sites

9. Immediate priorities from 2019

The priorities listed here are derived from the conservation advices with some amendments made by contributing experts based on new information. Identification of these priorities in this document is for information and is non-statutory. For statutory conservation planning documents, such as Recovery Plans or Conservation Advices, please see Section 11.

Data collection:

- Population trajectory estimates for all sites;
- Monitoring data relevant to assessment of population trajectories at all sites;
- Assessments of population viability/trends relative to cat density;
- Assessments of impacts of a range of fire regimes.

Management actions:

- Reintroductions to at least one more large predator enclosure on mainland [AWC plans to introduce bandicoots to Newhaven in 2019, and potentially Mallee Cliffs subject to approval];
- Protect island populations from invasive species and implement adequate biosecurity programs;
- Translocation to introduced predator-free areas to expand the range/number of secure populations;
- Implement Martu-led tracking and monitoring of this species (to ensure knowledge is passed on), feral predator management and fire management;
- Maintain appropriate fire regimes at all sites (critical in remnant populations on the mainland);
- Effective predator management, including the development of effective feral cat control techniques for use in northern Australia;
- Development of a more robust monitoring program for the Wessel Islands population, particularly Marchnibar Island, as the founder population may not have completely recovered from removal of individuals for translocation;
- Resolve taxonomy.

10. Contributors

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11. Legislative documents

SPRAT profile: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66665

Threatened Species Scientific Committee (2015). *Conservation Advice* Isoodon auratus auratus *Golden Bandicoot*. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/66665-conservation-advice-01102015.pdf>. In effect under the EPBC Act from 01-Oct-2015

Department of the Environment (2014). *Approved Conservation Advice for Isoodon auratus barrowensis (Golden Bandicoot (Barrow Island))*. Canberra: Department of the Environment. Available from: <http://www.environment.gov.au/biodiversity/threatened/species/pubs/66666-conservation-advice.pdf>. In effect under the EPBC Act from 11-Apr-2014.

[Recovery plan for the Golden Bandicoot Isoodon auratus and Golden-backed Tree-rat Mesembriomys macrurus 2004 - 2009](#) (Palmer, C., R. Taylor & A. Burbidge, 2003) In effect under the EPBC Act from 11-Apr-2005. Ceased to be in effect under the EPBC Act from 01-Oct-2015

12. References

- Burbidge, A., Johnson, K., Fuller, P., and Southgate, R. (1988). Aboriginal knowledge of the mammals of the central deserts of Australia. *Australian Wildlife Research* **15**, 9-39.
- Burbidge, A. A. (1999). Conservation values and management of Australian islands for non-volant mammal conservation. *Australian Mammalogy* **21**, 67-74.
- Burbidge, A. A. and Abbott, I. (2017). Mammals on Western Australian islands: occurrence and preliminary analysis. *Australian Journal of Zoology* **65**, 183-195.
- Burbidge, A. A., Blyth, J. D., Fuller, P. J., Kendrick, P. G., Stanley, F. J., and Smith, L. E. (2000). The terrestrial vertebrate fauna of the Montebello Islands, Western Australia. *CALMScience* **3**, 95-107.
- Burbidge, A. A. and Fuller, P. J. (1998). Seabird Islands no. 241: Montebello Islands, Pilbara region, Western Australia. *Corella* **22**, 118-122.
- Christensen, P. and Burrows, N. (1994). Project desert dreaming: experimental reintroduction of mammals to the Gibson Desert, Western Australia. In 'Reintroduction biology of Australian and New Zealand fauna'. (Ed. M. Serena) pp. 199-207. (Surrey Beatty & Sons: Chipping Norton.)
- Garnett, S.T., Butchart, S.H.M., Baker, G.B., Bayraktarov, E., Buchanan, K.L., Burbidge, A.A., Chauvenet, A.L.M., Christidis, L., Ehmke, G., Grace, M., Hoccom, D.G., Legge, S.M., Leiper, I., Lindenmayer, D.B., Loyn, R.H., Maron, M., McDonald, P., Menkhorst, P., Possingham, H.P., Radford, J., Reside, A.E., Watson, D.M., Watson, J.E.M., Wintle, B., Woinarski, J.C.Z., and Geyle, H.M. (2018) Metrics of progress in the understanding and management of threats to Australian Birds. *Conservation Biology* <https://doi.org/10.1111/cobi.13220>.
- Gibson, L. A. and McKenzie, N. L. (2012). Occurrence of non-volant mammals on islands along the Kimberley coast of Western Australia. *Records of the Western Australian Museum Supplement* **81**, 15-39.
- Hemming, V., Burgman, M.A., Hanea, A.M., McBride, M.F., and Wintle B.C. (2017) A practical guide to structured expert elicitation using the IDEA protocol. *Methods in Ecology and Evolution*, **9**, 169-180.
- Hohnen, R., Tuft, K., McGregor, H. W., Legge, S., Radford, I. J., and Johnson, C. N. (2016). Occupancy of the invasive feral cat varies with habitat complexity. *PLoS ONE* **11**, e0152520.
- Leahy, L., Legge, S. M., Tuft, K., McGregor, H., Barmuta, L., Jones, M. E., and Johnson, C. N. (2016). Amplified predation after fire suppresses rodent populations in Australia's tropical savannas. *Wildlife Research* **42**, 705-716.
- McGregor, H. W., Legge, S., Jones, M. E., and Johnson, C. N. (2014). Landscape management of fire and grazing regimes alters the fine-scale habitat utilisation by feral cats. *PLoS ONE* **9**, e109097. doi: 10.1371/journal.pone.0109097.
- McKenzie, N. L. (1981). Mammals of the Phanerozoic South-West Kimberley, Western Australia: biogeography and recent changes. *Journal of Biogeography* **8**, 263-280.

- Morris, K., Page, M., Kay, R., Renwick, J., Desmond, A., Comer, S., Burbidge, A., Kuchling, G., and Sims, C. (2015). Forty years of fauna translocations in Western Australia: lessons learned. In 'Advances in Reintroduction Biology of Australian and New Zealand Fauna'. (Eds D. P. Armstrong, M. W. Hayward, D. Moro, and P. J. Seddon) pp. 217-235. (CSIRO Publishing: Clayton.)
- Parker, S. A. (1973). An annotated checklist of the native land mammals of the Northern Territory. *Records of the South Australian Museum* **16**, 1-57.
- Short, J. and Turner, B. (1994). A test of the vegetation mosaic hypothesis: a hypothesis to explain decline and extinction of Australian mammals. *Conservation Biology* **8**, 439-449.
- Sims, C., Morris, K., and Blythman, M. (2017). Rangelands restoration: fauna recovery at Matuwa (Lorna Glen), Western Australia, annual report 2016. Department of Parks and Wildlife. (Woodvale, WA.)
- Southgate, R., Palmer, C., Adams, M., Masters, P., Triggs, B., and Woinarski, J. (1996). Population and habitat characteristics of the Golden Bandicoot (*Isoodon auratus*) on Marchinbar Island, Northern Territory. *Wildlife Research* **23**, 647-664. doi: 10.1071/wr9960647.
- Westerman, M., Kear, B. P., Aplin, K., Meredith, R. W., Emerling, C., and Springer, M. S. (2012). Phylogenetic relationships of living and recently extinct bandicoots based on nuclear and mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution* **62**, 97-108.
- Woinarski, J. C. Z., Burbidge, A. A., and Harrison, P. L. (2014) 'The Action Plan for Australian Mammals 2012.' (CSIRO Publishing: Melbourne.)
- Woinarski, J. C. Z., Palmer, C., Fisher, A., Southgate, R., Masters, P., and Brennan, K. (1999). Distributional patterning of mammals on the Wessel and English Company islands, Arnhem Land, Northern Territory, Australia. *Australian Journal of Zoology* **47**, 87-111. doi: 10.1071/zo99004.
- Woinarski, J. C. Z. and Winderlich, S. (2014) 'A strategy for the conservation of threatened species and threatened ecological communities in Kakadu National Park, 2014-2024.' (North Australian Hub of the National Environmental Research Program: Darwin.)

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