

**REPORT TO THE CONSERVATION COMMISSION OF WA
IN RESPECT TO KEY PERFORMANCE INDICATOR 2 OF
THE FOREST MANAGEMENT PLAN 2004 – 2013**

Brush-tailed Phascogale (Phascogale tapoatafa tapoatafa ssp. WAM M434)

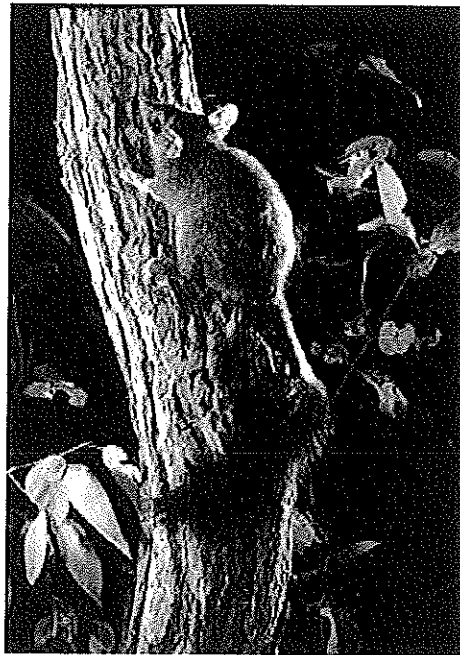


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**SUSTAINABLE FOREST MANAGEMENT DIVISION
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ISSUE

Inclusion of the south-western Australian taxon of the Brush-tailed Phascogale in Western Australia's Threatened Species List, listed as 'Vulnerable' using International Union for Nature Conservation (IUCN) criterion A2¹, has raised questions as to the implications for forest management in the context of the *Forest Management Plan 2004 – 2013* (FMP).

FOREST MANAGEMENT PLAN 2004-2013 REQUIREMENT

The target for key performance indicator 2 (KPI 2) of the FMP, the status of forest dwelling species and ecological communities, is that:

No species or ecological community will move to a higher category of threat as a result of management activities.

In response to a target shortfall for KPI 2 the Department of Environment and Conservation (DEC) is required "to investigate the cause of a change to a more threatened category and report to the Conservation Commission and the Minister for the Environment".²

In December 2006 the then Minister for the Environment accepted the recommendation of the WA Threatened Species Scientific Committee (TSSC) to add the Brush-tailed Phascogale to Western Australia's Threatened Species List. The recommendation was based on surveys conducted in jarrah forest areas which showed a marked decline in capture success since 1994.

(A copy of the Fauna Nomination Form submitted for consideration by the TSSC is at Attachment 1.)

This report addresses the KPI 2 requirement to investigate the cause of a change to a more threatened category and report to the Conservation Commission and the Minister for the Environment.

TAXONOMY, HABITAT, DISTRIBUTION AND ABUNDANCE OF THE BRUSH-TAILED PHASCOGALE

The taxonomy of the Brush-tailed Phascogale located in the south-west of the State is still under consideration. Genetic evidence suggests that there should be three subspecies of Brush-tailed Phascogale, northern Australian, eastern and south-eastern Australian, and south-western Australian.

The range of the proposed south-western Australian species of Brush-tailed Phascogale is predominately within the area managed under the FMP, that is, the south-west region of Western Australia from Perth through to Albany (A Range map is on page 5 of Attachment 1). It has been observed in woodland and open forests, although records are less common for wetter forests. The Brush-tailed Phascogale has an arboreal foraging habit and a preference for mature trees for nesting hollows; although, the potential of smaller trees to provide nesting hollows should not be overlooked (Abbott and Whitford (2002)).

¹ IUCN Criterion A2 – Population reduction observed, estimated, or suspected in the past where the causes of reduction may not have ceased OR may not be understood OR may not be reversible, based on (a) to (e) under A1. A1 (a) direct observation, (b) an index of abundance appropriate to the taxon, (c) a decline in area of occupancy, extent of occurrence and/or habitat quality, (d) actual or potential level of exploitation, (e) effects of introduced taxa, hybridisation, pathogens, pollutants, competitors of parasites.

² *Forest Management Plan 2004 - 2013*

Abbott (in press) remarked that the Brush-tailed Phascogale numbers have 'fluctuated markedly' since 1880s, being 'fairly numerous' at Warren River (1925) and becoming 'rather rare' in karri forest (1927). There is observational and anecdotal evidence that this species fluctuates in abundance, amplified by annual male die-off following breeding. In 1994 the species was relatively abundant at Kingston forest block near Manjimup (Rhind 1996) when trapping surveys of the species were carried out as part of an investigation into the impacts of timber harvesting on biodiversity. In 1995, and before any timber harvesting treatments were imposed, the species declined and has not been recorded in Kingston forest since the late 1990s (Wayne et al. 2001). From 2001, Brush-tailed Phascogales have been seen near roads and tracks in the Manjimup district (*I. Wilson pers. Comm.*). Although not well documented, similar declines have been observed in other forest areas (such as Perup Nature Reserve) in the absence of timber harvesting. It has been suggested that population decline and recovery are a 'natural cycle' consistent with the species having a 'boom-bust' pattern. However, drivers of this cycle are not well understood.

The inclusion of the Brush-tailed Phascogale on the threatened fauna list was not as a result of a sudden recent decline to a dangerous threshold that might be studied and attributed, but it was as a result of populations not recovering to the high population levels recorded during 1994. In relation to population fluctuations, it is known that Phascogale populations do fluctuate but the drivers, apart from the annual male die-off, are unknown; and the reported post 1994 decline occurred independently of timber harvesting and fire and was coincident with a decline in abundance of invertebrates (which are the staple diet for Phascogales). Critical information that is not known includes the identification of the key drivers of population fluctuation and determining whether the high population levels reported for Kingston forest in 1994 were exceptional or normal, and is the current low population level 'normal'? That is, what is the population fluctuation ranges (amplitudes) and thresholds?

THREATENING PROCESSES

Threatening processes likely to impact on the Phascogale are:

- habitat clearing and fragmentation in the Wheatbelt;
- loss of tree hollows due to timber harvesting, mining, dieback disease and competition from feral bees;
- predation by foxes and cats³;
- large, high intensity fire; and
- environmental stress (such as prolonged drought) and disease.

There is limited information about the impacts of most of these threatening processes on the Brush-tailed Phascogale, with the exception of studies which have been done on the impacts of timber harvesting and associated operations in the Kingston forest trial, the results of which are reported in the section below.

The present range of the Brush-tailed Phascogale is believed to have been reduced to the south-west corner of the Western Australia from Perth to Albany as a result of habitat clearing and fragmentation, due to agriculture. Abbott (in press) notes that the species became locally extinct near Kellerberrin by the late 1890s, but reappeared in 1917-18. The impact of predation by foxes and cats is largely anecdotal with observed decline in the population with the arrival of the fox and a noted recovery of populations following fox baiting in the 1990s (Abbott, in press). Large scale fires could have significant impact on

³ Fauna Species profile, NatureBase website

whole populations of Brush-tailed Phascogale, but there has been no observation of this impact. There is some evidence supporting the explanation that the population decline from 1994 could be related to declining food resource, including weight loss and coincident decline in invertebrate captures, which in turn was associated with environmental stress through drought. However, these symptoms could also suggest a disease epidemic.

THE KINGSTON FOREST TRIAL

The Brush-tailed Phascogale is difficult to observe and available information on the impact of forest disturbance activities is limited. The species was studied in the Kingston trial (the study) and reported on by Rhind (2004). Studies were complicated by the simultaneous population decline on control and treatment grids in Kingston in the latter half of 1994 prior to the application of the timber harvesting treatment.

The study found that the Brush-tailed Phascogale continued to forage in areas after they were logged, but only very rarely used nesting sites in the logged areas. The author concluded that this was most likely simply due to the absence of suitable hollows; a similar conclusion was arrived at in an earlier 1996 publication. This conclusion was contested by Armstrong and Abbott (1996). In critiquing Rhind's 1996 findings Armstrong and Abbott (1996) found major limitations in the experimental design used by Rhind and that there were many more potential hollow-bearing trees in the study area than reported by Rhind. Abbott and Whitford (2002) found that there is total of 37 potential habitat trees/hectare of a size suitable for creating a hollow large enough for a Brush-tailed Phascogale.

CURRENT MANAGEMENT OF FAUNA IN AREAS SUBJECT TO TIMBER HARVESTING

The Kingston study results led to changes to the general fauna requirements for timber harvesting, which were introduced in the FMP. As tree hollows are the critical habitat element likely to be affected by timber harvesting, the FMP introduced additional retention of habitat trees (primary from 3/ha to 5/ha and a new requirement for secondary at 6 – 8/ha). In addition, the FMP introduced a network of fauna habitat zones (FHZ) of a minimum of 200 ha in size spaced systematically between 2 and 4 kilometres apart. The objective of FHZs is to provide significant areas of relatively undisturbed habitat for fauna as a source of animals for re-colonisation of regenerating forest. While the Western ringtail possum and the common brushtail possum were the primary drivers for these additions, the needs of the Brush-tailed Phascogale and other fauna (vertebrate and invertebrate) that required specific habitat provided by mature forest (primarily tree hollows and mature forest structures) were also considered. A greater than average concentration of FHZs was established in the Greater Kingston Area because of the importance of this area for a number of species of fauna.

The FMP has been structured to cater for the sustainability of fauna populations at the whole of forest, landscape and operational scales. This is achieved through the retention of habitat in the formal reserve system (whole of forest scale), informal reserve system and fauna habitat zones (landscape scale) (the formal and informal reserves accounts for 52 per cent of jarrah forest), and strategies at the operational scale including the retention of habitat trees and ground logs, limits on gap size and minimum retained basal area in areas subject to timber harvesting. Attached is an extract from the current (2004) silviculture guideline for jarrah forests detailing the rate of retention of habitat trees (Attachment 2). In addition, since 1996, there is a whole of forest control of the threatening process of fox predation through the Western Shield program.

At a species-specific level the likely presence of fauna in each area proposed to be harvested is predicted using the Fauna Distribution Information System (FDIS). The authors of FDIS have identified nine species of fauna of concern with respect to timber

harvesting and 21 of concern with respect to prescribed burning and have indicated additional management actions that might be undertaken to increase their protection. The species identified as requiring additional management actions in relation to timber harvesting operations are:

Tammar wallaby (*Macropus eugenii*) CD, P4
Quokka (*Setonix brachyurus*) VU
Mallee Fowl (*Leipoa ocellata*) VU
Noisy Scrub bird (*Atrichornis clamosus*) VU
Western ringtail possum (*Pseudocheirus occidentalis*) VU
White-bellied frog (*Geocrinia alba*) CR
Orange-bellied frog (*Geocrinia vitellina*) VU
Nornalup frog (*Geocrinia lutea*) VU
Sunset frog (*Spicospina flammocaerulea*) VU

FDIS categorises the Brush-tailed Phascogale as not requiring additional management action, but indicates that it was one of a number of species "prudent to keep an eye on". This indicates that "their requirements are believed to be catered for by the reserve system and the conditions listed in the *Forest Management Plan 2004-2013*", however, acknowledging that "things might change in the future".

PRECAUTIONARY MANAGEMENT

The precautionary principle is one of the fundamental principles underpinning the FMP and states:

That if there are threats of serious or irreversible environmental damage, the lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Raising the level of threat for the Brush-tailed Phascogale from P3 to inclusion on the threatened species list as vulnerable requires consideration of whether management responses are needed to ameliorate the perceived increased threat to the species.

From the discussion above, it is clear that there is uncertainty as to what has caused the decline of the Brush-tailed Phascogale population. Despite this uncertainty measures to prevent environmental degradation need to be considered. The recommendations made by Rhind (2004) provide a useful framework to consider what may be appropriate management responses:

1. Maintain the post timber harvesting monitoring of Phascogale populations

DEC continues to monitor the population of Phascogales at Kingston and in the greater Perup area. The 'Rhind' nest box grids have been re-established and these are monitored on an annual basis. Results to-date show that the population is still at very low levels relative to the 1994 level recorded by Rhind at both Kingston forest and the Perup Nature Reserve (A. Wayne, Pers Com).

2. *Maintain fox baiting*

Fox baiting is undertaken as a routine operation carried out by DEC in the south-west forests under the umbrella of Western Shield and as a result of the Kingston study. There is limited knowledge about whether foxes are a serious threat to the largely arboreal Phascogale, therefore, it is not known whether fox baiting does in fact help Phascogales. Several years ago, and because the Phascogale population decline was regional rather than local, it was suggested that Phascogales may have been taking lethal quantities of fox baits. However, recent studies have ruled this out.⁴ Rhind canvassed the need to study predator/prey interactions resulting from fox baiting, which have the potential to impact on other species such as the Brush-tailed Phascogale but rejected recommending a study saying there was little justification for such high cost research.

3. *Monitoring the use of retained habitat trees to determine their efficacy*

No specific ongoing monitoring of the use of habitat trees in the Kingston study has been conducted. There are no quantitative data on numbers of trees utilised, however, retained habitat trees were actively used by possums during and after the harvesting in the trial area (A. Wayne, *Pers Com*). There are also a large number of trees, other than marked habitat trees, that may be or potentially be used by the Brush-tailed Phascogale. Such monitoring would require intensive radio tracking, which is costly in staff time.

4. *Selection of dead trees as habitat trees*

Dead standing trees contain more hollows than live trees, including those suitable for Brush-tailed Phascogales (Whitford 2002; Whitford and Williams 2002). Rhind (2004) noted that one third of the hollows used by Brush-tailed Phascogales in the study were in dead trees and recommended protecting dead and dying trees from harvest as a source of hollows and habitat. Current criteria for the selection of primary habitat trees make provision for the retention of dead standing trees where no suitable living candidates are present. Dead trees are not specifically identified for retention by the silvicultural guideline as they are vulnerable to fire and can be expected to persist for a somewhat reduced period compared to live trees. The silvicultural guideline for jarrah forest is being revised in 2008 and specific retention of standing dead trees could be considered in this review.

5. *Retention of trees and hollows in logged area*

Rhind (2004) suggests that 3-4 hollows per hectare is a reasonable target for the requirements of Brush-tailed Phascogale, however, she notes that numbers of retained trees does not necessarily equate to numbers of retained hollows. However, Abbott and Whitford (2002) note that the size requirements of trees for holes that suit the Brush-tailed Phascogale means that there are potentially 37 trees/hectare of a suitable size. The existing silviculture guideline has included the work undertaken by DEC that correlated tree characteristics with the likelihood of the presence of hollows. Without further work on correlating tree characteristics with hollow presence, nothing further can be gained in habitat tree selection other than to reconsider the value of emphasising dead trees in the selection process or require considerably more analysis of available trees by tree markers than what current tree marking practices encourage.

⁴ Science Division Research Activity Report 2005-2006

6. Further deferral of un-logged corridors / buffers

Strips of unharvested or lightly harvested forest known as a TEAS (Temporary Exclusion Areas) are left between areas of forest that are harvested for regeneration (gap creation). TEAS will be scheduled to be harvested between 15 years and 20 years but possibly up to 40 years after the original main timber harvesting activities. The conduct of timber harvesting in these areas is outlined in the silviculture guideline for jarrah forest (2004).

However, both the implementation of the *Protecting our old-growth forests policy* and the introduction of FHZ have altered the significance of the timber harvesting of TEAS strips to the protection of arboreal species. The cessation of the timber harvesting of old-growth forest has resulted in significantly less gap creation and consequently retention of TEAS strips and FHZ were introduced to provide additional areas of protected, predominantly mature, habitat to compensate for the expected subsequent timber harvesting of TEAS.

Access to TEAS is scheduled in the sustainable yield calculated under the FMP and altering the availability of these areas would be a significant change to the underlying settings of the FMP and impact on the non-declining sustained yield.

RECOMMENDATIONS

In response to the inclusion of the south-western Australian taxon of the Brush-tailed Phascogale on the Threatened Species List, DEC will:

1. Continue to monitor the Brush-tailed Phascogale population in Greater Kingston and the Perup to determine long term trends in population fluctuation and physical drivers of these fluctuations including climate and fire regimes; and
2. Conduct further research on the ecology, life history and population decline of the Brush-tailed Phascogale, especially with respect to the question of disease, subject to other DEC priorities for fauna research. Further research on the Brush-tailed Phascogale could include:
 - a. collation of data, including museum records, of former and current distribution.
 - b. collation of all available evidence of population change over time;
 - c. analysis of spatial, temporal and demographic characteristics with population change;
 - d. syntheses of knowledge on the species' ecology; and
 - e. collation of associative evidence, e.g. resources, population cycling
3. Consider the need to specify the retention of standing dead trees as habitat trees through the revision of the jarrah silvicultural guideline being undertaken in 2008;

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ADVICE TO THE CONSERVATION COMMISSION OF WESTERN AUSTRALIA ON:

Specific and immediate actions that can be taken to help conserve the Wambenger (Brush-tailed Phascogale) within the area subject to the Regional Forests Agreement and covered by the Forest Management Plan 2004-2013

1. Introduction.

As discussed briefly at the Conservation Commission April meeting, staff within Nature Conservation and Sustainable Forest Management Divisions have considered what specific actions could possibly be justified and taken that would clearly assist in the conservation of the Brush-tailed Phascogale. While there are undoubtedly many actions that could be taken, we have had significant difficulty identifying how such actions would be demonstrated to do assist conservation of the species.

As the Phascogale Working Group has reported, comparatively little is known of the ecology of the Wambenger and its response to forest disturbances. No specific causes have been proven for its decline and there is no clear evidence that decline in managed forest areas is any different to decline in conservation reserves or elsewhere. More significantly, there are no clear methods available to assess abundance of wambengers or to relate changes in abundance to measurable environmental parameters. Unfortunately, wambengers are an extremely difficult species to monitor and study.

2. Current Status

The subspecies *Phascogale tapoatafa* ssp. (WAM M434) is currently specially protected as threatened fauna under the *Wildlife Conservation Act 1950*. Recent taxonomic revision has combined this subspecies with *Phascogale tapoatafa* which is found on the eastern seaboard and is not listed as threatened nationally under the *Environment Protection and Biodiversity Conservation Act 1999*. Under current Departmental policy it is questionable whether there is justification in retaining wambengers as a threatened taxon, given the single national species grouping and status.

3. Key Ecological constraints

Wambengers are believed to have a highly variable density and distribution across the southwest. They are found in farmland and rural communities adjacent to forest and through a range of forest types, including formal conservation reserves. They appear to have a very patchy distribution and for this distribution to change over time. However, the extent to which this is true or an artefact of the difficulty in locating the species is unknown. There are theories that the species goes through boom and bust cycles across its distribution and areas of occurrence, but again this has not been proven.

The species is very difficult to study and has been comparatively poorly studied. Nest boxes have been used in some cases to determine habitat use, but there are problems in establishing how wambengers use nest boxes and it is believed that artificial nest boxes must age in a location before wambengers will use them. Again, nest boxes have not been demonstrated to be a totally reliable monitoring tool.

Results from ongoing studies of forest fauna, primarily at Kingston forest, have suggested significant declines in population size for the species, which mirrors more anecdotal accounts

elsewhere, however these declines have not been linked to forest management practices and appear to have declined across conservation areas as well.

4. Recommendations for action from Draft Conservation Commission Working Group Report

The draft report does not have a completed recommendations section, but does identify 3 possible immediate areas for action related to forest management. These are:

- Change tree retention criteria to emphasize retention of mature senescent trees for habitat in combination with a targeted audit to determine to what extent the tree retention requirements are being implemented in a consistent manner that is delivering useable habitat.
- Preparation of a Species Recovery Plan for Wambenger
- Raising the public focus on wambengers, including education and involvement in programs including nest boxes etc.

The draft report also includes an appendix that identified areas of further consideration for improving the conservation of wambengers in the following categories

- Reducing predation
- Reducing competition for hollows
- Reducing forest diseases to reduce impacts on forest structure and food supplies
- Increase shelter (habitat)
- Improve connectivity to increase overall habitat space available
- Captive studies of the species

5. Requirements for worthwhile ongoing monitoring and species conservation program

The Conservation Commission has determined that it wishes to take immediate actions to help conserve the wambenger in areas covered by the current Forest Management Plan. In order to achieve this we must determine what changes we can make to current management that will actually improve the conservation status of the wambenger and we need to be able to demonstrate that this is the case. It would be a waste of time to undertake activities that do not improve the conservation status and possibly be a waste of time to undertake activities that do not clearly improve the conservation status (or at least reduce declines).

A second consideration must be the impacts of any proposed changes on the forest industries. Activities that do not help the conservation of wambengers, but are of detriment to forest industries should be avoided. Activities that do not clearly improve the conservation situation for wambengers but have an impact on forest industries should be considered carefully.

Thus we have two aspects that we need to consider foremost in determining a way forward.

- Identification of actions that are likely to help conserve wambengers in managed forests; and
- Identification of ways to demonstrate whether the desired improvement occurs and that it is due to the forest management actions implemented.

We have already seen that we have relatively poor understanding of the ecology, and certainly the population dynamics, of wambengers and so identifying what is causing declines is

problematic. We also have no proven reliable means of monitoring the species in terms of population abundance and habitat use and insufficient information across the range of the species on population fluctuations to use as a comparative baseline in order to determine to what extent observed changes to wambenger abundance/age distribution/survival in forest areas are attributable to conservation actions.

6. Discussion to a way forward

It is quite clear that we cannot recommend a suite of actions that can be undertaken that we can be reasonably sure will assist conservation of wambengers and also deliver measurable outcomes. We simply do not know enough about the species to do this. In the absence of this information we can consider that the State needs to immediately determine if it wants to do something for wambengers and if it does, we need to undertake targeted research and perhaps adaptive management to give the framework of actions and monitoring required. This would involve immediate preparation of an Interim Recovery Plan and refinement of species capture and monitoring techniques, along with studies across formal and informal reserves, private property and harvested forest to determine benchmarking information on habitat use and abundance. These studies would also hopefully allow us to determine the extent to which forest harvesting has impacts of significance to wambenger conservation and to determine theoretical treatment modifications to reduce any such impacts.

We can, however, also determine that, even in the absence of the information we need to be sure that we can do something positive for wambengers; we can take some actions which we believe may be beneficial. If we are to do this we have to rely significantly on opinion and theory and in so doing, it would be wise to limit our actions to those that do not significantly impact on forest industries.

7. Recommendations

- 7.1 An urgent review is undertaken by Species and Communities Branch to determine whether the now single species of *Phascogale tapoatapa* should be retained as a specially protected (threatened) species under the *Wildlife Conservation Act 1950*.
- 7.2 If the Wambenger is retained as a threatened species in WA, consideration be given to preparation of an Interim Recovery (and research) Plan for the species as a priority. This Plan to focus on identifying the most reliable monitoring techniques and benchmarking species populations across various habitat types, as well reviewing current science on the species, including in eastern Australian populations.
- 7.3 An audit is undertaken of the performance of current tree retention criteria across areas understood to be wambenger habitat, in terms of the retention of trees that provide suitable habitat for wambengers. This would be undertaken with a view to determine if the extent to which there is variation in this performance and the extent to which retained trees meet predicted habitat requirements for wambengers. The audit should also consider to what extent habitat trees are being lost under current prescriptions and the possible impact for wambengers and timber yields of changed prescriptions.

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