



Australian Government

Department of the Environment, Water, Heritage and the Arts

**Background Paper to EPBC Act Policy Statement 3.10 -
Nationally Threatened Species and Ecological Communities**

**Significant impact guidelines for the vulnerable western
ringtail possum (*Pseudocheirus occidentalis*) in the southern
Swan Coastal Plain, Western Australia**

Department of the Environment, Water, Heritage and the Arts – 2009

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Introduction

This paper provides background to *EPBC Act Policy Statement 3.10 – Significant impact guidelines for the vulnerable western ringtail possum (Pseudocheirus occidentalis) in the southern Swan Coastal Plain, WA*, hereafter referred to as the policy statement. This background paper provides the biological and ecological context to the policy statement, including the habitat areas, significant impact thresholds and mitigation measures defined for the western ringtail possum in the southern Swan Coastal Plain.

This policy has been prepared based on the best available information, and in consultation with a wide range of experts including some members of the Western Ringtail Possum Recovery Team. It recognises that information on the western ringtail possum is incomplete and that there are knowledge gaps. Increases in knowledge will be accounted for in future policy revisions.

Conservation status

The western ringtail possum, also known as the ngwayir, is listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The species is also listed as 'fauna that is rare or likely to become extinct' under the *Western Australian Wildlife Conservation Act 1950*. The listing of a species, subspecies or ecological community on the EPBC Act threatened species and ecological communities list recognises the importance of the matter in a national context, and does not replace listing under state, regional or local legislation or regulations.

Judgements on impacts may differ between Commonwealth, State and local decision making processes, due to the different laws and requirements for consideration. If your activity could affect the species or individual animals you should contact the relevant State and local authorities regarding your obligations, in addition to the Department for the Environment, Water, Heritage and the Arts (DEWHA).

About the western ringtail possum

Description

The western ringtail possum is a medium-sized nocturnal marsupial up to 1.3 kg in weight and approximately 40 cm in body length. The fur is dark brown above with cream to grey fur underneath. The tail grows to 41 cm long and terminates in a white tip. The western ringtail possum can be distinguished from the Common Brushtail Possum (*Trichosurus vulpecula*) by its smaller rounded ears and thin prehensile tail, which is as long as its body (de Tores 2008).

Distribution

The western ringtail possum was once widely distributed across southern and south-western Western Australia (WA). Much of the former habitat of the species was cleared or fragmented during the agricultural development of south-western WA, with extensive local extinctions occurring in the more northern and inland parts of the original range of the species in the 20th

century (Jones et al. 1994a, de Tores et al. 2004, Jones 2004). Habitat loss, degradation and other threatening processes have now contracted the distribution of the western ringtail possum to wetter areas in the south-western WA (de Tores et al. 2004, Dickman 2007, 2008). Today, the western ringtail possum has a patchy distribution in forests and woodlands of south-western Australia from the Collie River near Bunbury to Two Peoples Bay near Albany (Jones et al. 1994a).

Detailed population numbers are unknown and estimates are difficult to obtain due to difficulties in surveying the species (de Tores et al. 2004), and the scattered nature of the populations. In addition, information on the western ringtail possum is not consistently available from across the species' range, with some local populations having been the subject of long-term study, whilst other areas have not received basic surveys to determine presence.

The southern Swan Coastal Plain Region possesses unique characteristics that may provide the region's western ringtail possum population with resilience to threatening processes (Figure 1). The area is considered an important 'stronghold' for the species (Jones et al. 2004), with a dense and productive peppermint (*Agonis flexuosa*) habitat supporting the highest density western ringtail possum population, and a lower fire impact history compared to other areas of Western Australia where the species is known. The southern Swan Coastal Plain Region also provides the potential for genetic exchange with adjacent occupied areas (e.g. via riparian corridors connecting populations on the plains to those in the scarp). Accordingly, this region is considered an important refuge that may also provide for future recovery opportunities.

Habitat

Western ringtail possums are arboreal, spending most of their time in trees. Western ringtail possum habitats are typically located close to water courses, swamps, or on floodplains (Jones et al. 1994a) and provide the cooler conditions favoured by the species (de Tores et al. 2004). Canopy continuity is an important predictor of western ringtail possum abundance, with the highest density populations occurring in areas with higher canopy continuity (Jones et al. 1994a).

In the near coastal or coastal habitats of the southern Swan Coastal Plain, the western ringtail possum predominately occurs in peppermint forest and woodland, and tuart (*Eucalyptus gomphocephala*) forest, usually with a peppermint understorey. Jones et al. (1994a) reported a general trend for peppermint leaves at occupied sites to have relatively higher nutrient (particularly nitrogen) levels in late summer, when nitrogen and phosphorus levels were at an annual low. Areas with an understorey containing sword sedge and *Lepidosperma* spp. are also important habitat areas for the western ringtail possum in the southern Swan Coastal Plain (de Tores 2008).

During daylight hours, the western ringtail possum preferentially rests singly (or with young) in tree hollows and dreys (nests constructed from vegetation) (Jones et al. 1994b). At sites with intact, dense understorey (e.g. of sword sedge and *Lepidosperma* spp.) the species may regularly use rest sites on the ground (de Tores 2009, pers. comm.). Jones et al. (1994a & b) suggest

that on-ground rest sites (e.g. hollow logs) may be preferentially used during high temperatures.

An individual's home range is usually less than five hectares, and in the high density populations in the southern Swan Coastal Plain can be below one hectare. Home range size is dependant on interacting factors, such as population density, habitat productivity and climatic conditions, which can influence shelter selection (Jones et al. 1994a & b, Jones & Hillcox 1995). The highest density populations are generally found in mature peppermint remnants. However, young and vigorous peppermint trees are also an important nutritional resource for the western ringtail possum in the southern Swan Coastal Plain.

The following habitat parameters influence western ringtail possum abundance in the southern Swan Coastal Plain:

- the species of trees present
- the abundance of foliage/extent of canopy cover
- nutritional quality of the leaves available, and
- the abundance and depth of tree hollows or suitable canopy for construction of shelters (dreys) (Jones et al. 1994a & b).

The two habitat communities primarily used by the western ringtail possum in the southern Swan Coastal Plain are:

Coastal peppermint dominated communities – Peppermint-dominated communities on sand with perched/shallow fresh groundwater that are generally within one kilometre of the coast, including areas where this habitat type occurs as remnants.

This habitat type:

- has the highest known density populations, which are considered to be more robust than other, lower density populations and therefore necessary for the long term survival and recovery of the species
- supports the western ringtail possum foraging, breeding, and dispersal to the extent that the area has the highest known species fecundity
- includes some habitat where the common brushtail possum does not co-occur with the western ringtail possum, reducing competition between the species. However, one site that supports a very high density western ringtail possum population also supports a brushtail possum population (de Tores & Elscot, *in prep.*).

Myrtaceous and other communities – Communities with a mosaic of eucalypt woodlands and forest with varying peppermint presence, including occasional peppermint-dominated gullies, sheltered, wet and/or sandy sites.

This habitat type:

- supports the western ringtail possum breeding, foraging, dispersal, and may support movement between primary breeding habitats

- includes some habitat where the common brushtail possum co-occurs with the western ringtail possum.

Western ringtail possums are distributed in both intact habitat patches and in vegetation remnants. Remnants, including areas where the remaining vegetation is isolated, degraded or occurs only as paddock trees, may still play an important role in connecting larger patches of remaining habitat. Restoration of these degraded patches, particularly when they have the potential to provide connectivity, will support the recovery of the species in the southern Swan Coastal Plain.

In order to protect the western ringtail possum in the southern Swan Coastal Plain, it is important to ensure that the ecological function of these habitats is maintained and sufficient connections within and between patches of vegetation remain or are re-built.

Breeding

In the southern Swan Coastal Plain western ringtail possums breed once, and occasionally twice, a year (Jones et al. 1994b, de Tores 2009, *pers. comm.*). Females may give birth to one to three offspring (normally one) (Jones et al. 1994b). Although breeding can occur at any time of year, it is most common in autumn (April-June) (Jones et al. 1994b).

Autumn breeding ensures that lactation and weaning, which have the highest nutritional demands on females, occur in spring and summer when new shoots are abundant. The young gain independence at six to seven months, although young (especially females) may stay with their mother for up to four more months. While longevity studies are limited, the species is thought to live an average of three to five years in the wild, with some longer lived individuals recorded (de Tores et al. 2004, de Tores 2008).

Diet

In the southern Swan Coastal Plain, the diet of the western ringtail possum consists mainly of the leaves from peppermint trees (around 90%), and to a lesser extent those of other myrtaceous plant species (Shepherd et al. 1997, de Tores 2008).

Key threats and recovery priorities

The key threats to the western ringtail possum in the southern Swan Coastal Plain include:

Habitat loss and fragmentation

Habitat degradation, fragmentation and clearing are the major threats facing many western ringtail possum populations. These processes have been extensive in both coastal and inland areas, occurring through urbanisation, agriculture and harvesting of forests (de Tores et al. 2004). Clearing and fragmentation of habitat has focused on the productive alluvial soils, often near water sources (Wayne et al. 2006). In the southern Swan Coastal Plain, these habitats support the most abundant populations of the western ringtail

possum. Habitat loss through dieback from *Phytophthora* spp. may also be an emerging threat to western ringtail possum habitat.

Loss of canopy continuity, which is used by individuals at the local level to access habitat patches, and loss of habitat corridors, which allow populations to remain connected in the landscape, can have serious impacts on western ringtail possum populations, particularly in modified landscapes. Corridors a continuous, or near continuous link of suitable habitat across a modified landscape that may otherwise impede movement of the species.

Predation by foxes (Vulpes vulpes) and cats (Felis catus)

Western ringtail possums are frequently preyed upon by introduced mammalian predators, being particularly vulnerable when on the ground. Fire for example, may reduce understorey cover, leading to an increase in predation by ground predators such as foxes and cats (Christensen 1980, in Jones et al. 1994). Possums are also known to descend to the ground more frequently when habitat linkages are fragmented (e.g. discontinuous overstorey), increasing their risk from ground predators. Fox control baiting programs in reserves are believed to increase western ringtail possum numbers (de Tores et al. 2004, Abbott 2008). However, recent studies have suggested that cat and python (*Morelia spilota imbricata*) predation may increase when fox numbers are reduced (de Tores et al. 2005a & b, de Tores & Berry 2007, de Tores et al. 2008).

Altered fire regimes

Since European settlement, fire regimes have altered in intensity, frequency and seasonality. These changes have had a negative impact on the western ringtail possum by reducing food source availability, reducing refuge sites, and by directly or indirectly killing individuals with fire, smoke and increased predation (Wayne et al. 2006). The lack of fire scars in peppermint dominated coastal forests suggests that fire may have historically be less frequent or severe in these habitats (Jones et al. 1994a).

Competition with the common brushtail possum (Trichosurus vulpecula)

The larger common brushtail possum may compete with western ringtail possums for tree hollows, forcing evicted individuals to use less optimal refuge sites (e.g. sites on the ground). While competition between the two species has been observed, they are also known to co-occur in areas (Jones & Hillcox 1995, Jones 2000, de Tores et al. 2004). For example, a site which supports a very high density population of western ringtail possums also supports a brushtail possum population (de Tores & Elscot, *in prep*). Natural habitat partitioning may occur in these areas, allowing the two species to coexist.

Recovery of the species

A National Recovery Plan for the western ringtail possum is currently being prepared by the Western Australian Department of Environment and Conservation. The recovery plan is likely to be the first stage of a program that involves:

- increased understanding of the species
- a set of actions that aim to protect and prevent the extinction of the western ringtail possum, and
- a set of actions that aims to recover the species.

Recovery of the western ringtail possum to a state where the species is self sustaining in nature, and is no longer threatened, will require the persistence of robust populations and implementation of recovery actions. The consolidation and (in some areas) re-building of habitat for the western ringtail possum will be crucial to the recovery of the species.

Important areas in the southern Swan Coastal Plain

Three areas have been identified as important for the western ringtail possum within the southern Swan Coastal Plain: Core habitat, Primary corridors and Supporting habitat. These areas are shown in Figure 1. The identification and conservation of such areas is essential to development project planning, and will assist any referral or assessment process required under the EPBC Act.

Area 1 - Core habitat

Core habitat for the western ringtail possum includes vegetation remnants inhabited by local populations, and contains sites necessary for breeding and dispersal. Figure 1 shows the predicted location of Area 1 - Core habitat for the western ringtail possum on the southern Swan Coastal Plain.

Core habitat usually has high densities of western ringtail possums and occurs in areas of coastal peppermint forest and Tuart forest with peppermint sub-strata and continuous peppermint canopy. The habitat is generally conducive to vigorous foliage production, such as locations on sand with perched or shallow fresh groundwater, or supplemented with additional watering. Suitable habitat patches can occur in both urban and non-urban areas.

These areas contain the principal breeding population of the western ringtail possum, and support recruitment and population maintenance in the region. They are therefore necessary for maintaining genetic diversity and population viability in the region.

The ability of these areas to function to support the persistence and recovery of the western ringtail possum depends on the maintenance, augmentation or enlargement of remnant habitat patches, and the creation of new habitat patches. Protection of remaining patches, habitat corridors and habitat linkages are therefore very important.

The location of the core habitat areas are shown in Figure 1 and include:

- the coastal strip between Dunsborough and Port Geographe, including the Locke Nature Reserve and areas around Abbey, Broadwater, Busselton, and
- the Tuart Forest National Park and State forest.

Area 2 - Primary corridors

Primary corridors (Area 2) for the western ringtail possum have an important function in providing connectivity between areas of core habitat (Area 1), and allowing populations to remain connected in the landscape. Additionally, as urban development encroaches on core habitat it will be important to consolidate and build additional habitat in the primary corridor areas to support the species into the future. Figure 1 shows the predicted location of Area 2 – Primary corridors for the western ringtail possum on the southern Swan Coastal Plain.

The primary corridor areas support some western ringtail possum populations and may be made up of cleared areas and remnant habitat patches. Functioning primary corridors are distinguished from habitat linkages by their larger area and ability to support multiple possum home ranges. They are generally composed of both over and understorey vegetation, whereas habitat linkages include street-scape plantings of peppermint trees that allow possums to move from one area of habitat to another.

While the exact route has not yet been determined, it is envisaged that future development and other state and local government mechanisms will enhance the habitat in the primary corridor areas. Therefore, any action that restricts the ability of the area to provide its ecological function (primary corridors) would have a significant impact on the species. Development proposals in these areas should be designed to contribute to the enhancement of habitat for primary corridors. Protection and enhancement of these habitats will become increasingly vital as core habitat in urban areas declines.

Enhancement opportunities for western ringtail possum habitat are good, and peppermint-dominated habitat can be established in cleared, degraded or new areas. For this reason, some areas that currently have little or no functioning habitat may be vital to the long term strategy and survival of the species.

Area 3 - Supporting habitat

Supporting habitat includes vegetation patches that buffer key local populations from threats, as well as providing foraging, breeding, and dispersal opportunities. This habitat provides the opportunity for an immigration source and emigration destination to allow for natural fluctuations in the species' fecundity. Figure 1 shows the predicted location of Area 3 – Supporting habitat for the western ringtail possum on the southern Swan Coastal Plain.

Supporting habitat can provide internal connectivity between the other two important areas. It also provides for external connectivity and genetic exchange with adjacent management regions such as the Cape Naturaliste to Cape Leeuwin region to the south, the northern rivers region to the north, and the scarp to the east. Supporting habitat areas can have existing remnant vegetation that has a connective function, and/or areas that could enhance connectivity. Connective habitat is habitat in its own right and needs to include sufficient area and habitat values to accommodate a series of the western ringtail possum home ranges. Connective habitats generally allow for genetic transfer rather than just the movement of individuals.

The species' density and survivorship across supporting habitat is patchy, and the region's future effectiveness depends on the maintenance of patches of habitat that are at least loosely connected. The effectiveness of some supporting habitat can be predicted to decline in response to threats, such as sites in high density urban areas. However, other areas, for example lower (human) density areas, should be augmented as enhancement opportunities become available.

The location of the supporting habitat areas are shown in Figure 1 and include:

- the inland areas surrounding the core and primary corridor habitat areas, between Dunsborough and its surrounding area and Bunbury and its surrounding area
- the coastal strip from Busselton to south of Bunbury, and
- riverine corridors connecting the southern Swan Coastal Plain Region and the inland scarp.

Significant impact assessment

Whether or not an action is likely to have a significant impact depends upon the sensitivity, value and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. The potential for an action to have a significant impact will therefore vary from case to case. While the thresholds outlined below relate only to the western ringtail possum, consideration must also be given to the likely impacts of an action on other matters of national environmental significance.

Given the importance of the southern Swan Coastal Plain in the long-term survival and recovery of the western ringtail possum, an action is likely to have a significant impact on the species if it:

- reduces the ability of the region to support the persistence of the western ringtail possum
- modifies, destroys, removes or isolates remnant habitat patches, or decreases the availability or quality of remnant habitat patches
- adversely affects connections between important areas, or
- interferes substantially with the ability of the area to effectively contribute to the recovery of the species.

Significant impacts on the western ringtail possum

Having considered the threats to the western ringtail possum and its habitats on the southern Swan Coastal Plain, and in consultation with species experts, the Department of the Environment, Water, Heritage and the Arts is of the view that the following actions may constitute a significant impact on the species. Where there is a possibility of a significant impact on a matter of national environmental significance, a referral under the EPBC Act should be considered.

Area 1 – Core habitat

- clearing in a remnant habitat patch that is greater than 0.5 hectares in size
- clearing of more than 50% of a remnant habitat patch that is between 0.1 and 0.5 hectares in size, or
- fragmentation of existing habitat linkages.

Area 2 – Primary corridors

- clearing in a remnant habitat patch that is greater than 0.5 hectares in size
- clearing of more than 50% of a remnant habitat patch that is between 0.1 and 0.5 hectares in size
- fragmentation of existing habitat linkages, or
- degradation or sterilisation of an area to the extent that appropriate habitat could not be enhanced or re-established in the future.

Area 3 – Supporting habitat

- clearing in a remnant habitat patch that is greater than 0.5 hectares in size
- clearing of more than 50% of a remnant habitat patch that is between 0.2 and 0.5 hectares in size, or
- fragmentation of existing habitat linkages.

Notes

1. 'Habitat linkage' means any continuous native or exotic vegetation that allows animals to move between areas. Linkages can be as fine-scale as canopy cover between neighbouring trees. 'Fragmentation' of these linkages means to create a disjuncture between patches that affects the ability of animals to move, for example habitat trees separated by more than six metres.
2. Areas of relatively poor-quality habitat (for example dispersed individual habitat trees) in key connective corridors will still have high ecological value. The impact of their loss may depend on the availability of alternative corridors, the number of trees removed and the ability of the landscape to function following the proposed action.
3. The thresholds in the box above give guidance to the level of impact that is likely to be significant for the western ringtail possum at a site. They are not intended to be exhaustive or prescriptive, but rather to highlight the need to maintain the ecological function in the important areas.

Examples of actions

Below are a series of examples of actions to further clarify when the significant impact thresholds may apply. These examples should be read in conjunction with the significant impact thresholds outlined above and the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines – Matters of National Environmental Significance*, and should not be taken to be exhaustive or conclusive.

The following examples of actions, if undertaken within Areas 1, 2 or 3, are likely to have a significant impact on the western ringtail possum:

- establishing a new subdivision, a new road, or installation of new (or substantial expansion or modification of existing) distribution infrastructure for utilities for power, water and sewage, or similar action,

that involves clearing of a remnant habitat patch greater than the significant impact thresholds that apply to Area 1, 2 or 3.

Proposed actions in any of these areas should be designed to prevent triggering the relevant thresholds for a significant impact on the species.

Actions outside of the Areas 1, 2 and 3

Areas outside of Areas 1, 2 and 3 may still contain western ringtail possum populations. Actions undertaken outside of Areas 1, 2 and 3 may have a significant impact on the western ringtail possum, and should be considered in light of the principles outlined in this document. If the action is likely to, or will have a significant impact on the western ringtail possum, or if you are unsure, a referral to the Australian Government Minister for the Environment should be considered.

Surveys for the species in areas outside those mapped in Figure 1 may assist in determining the significance of a proposed action.

The presence of western ringtail possums can be determined by:

- observing day-time refuge sites (e.g. dreys or tree hollows) at dusk see animals as they become active and emerge to forage
- spotlighting at night when the species is active, and
- searching for dreys, scratches on tree trunks and faecal pellets during the day.

A combination of survey techniques is optimal for detecting the presence of the western ringtail possum.

Reliance on drey presence alone to determine western ringtail possum presence is complicated by the fact that other animals may use dreys originally constructed by western ringtail possums. Also, the absence of dreys does not indicate that the species is absent, as western ringtail possums frequently use naturally occurring refuges, such as tree hollows.

Detection of the species by spotlighting or faecal pellet counts is easier when the western ringtail possum population density is high. The presence of the species may be difficult to detect in areas of low population density. Repeat surveys should be conducted, and include an assessment of the vegetation on and near the site.

Weather and season can impact the effectiveness of spotlight surveys also. Individuals are more likely to be observed in the early evening on still, dry nights.

Mitigation measures

Mitigation activities are generally undertaken on the site of the development to avoid or reduce impacts. Ideally, mitigation measures should be incorporated into the design of a development so that significant impacts are unlikely to occur.

Care should be taken to ensure that any mitigation and/or management actions implemented for the western ringtail possum do not have a negative

impact on other matters of NES present at a site. The mitigation and management proposed at a site needs to take into account the needs of all matters of NES in a project area.

The following measures may assist in minimising impacts on the western ringtail possum. They should be used with the aim of reducing the impact of an action to below the thresholds laid out in this document. Avoidance measures should be considered the priority, followed by measures to reduce the level of impact. In many cases, a combination of mitigation measures may give the highest benefit.

Proposed actions should be designed to:

- retain and improve remnant habitat patches including corridors
- retain peppermint trees with a diameter at breast height of greater than ten cm, while also avoiding:
 - o soil disturbance within three meters of the trunk
 - o heavy branch pruning, which may affect connectivity of the canopy, and
 - o filling around the base of trees.
- avoid creating breaks of six metres or more in existing canopy cover
- use landscape plantings as a means of creating or improving connectivity. For example:
 - o plant and nurture new peppermint trees (and sedge understorey) to replace any that must be removed
 - o plant and nurture additional peppermint trees (and plant sedge understorey) to fill in gaps or enhance existing habitat
- where solid fences are required, construct to a height of 180–240 cm to allow possums to move around with less risk of dog attack.

Translocation

Translocation may benefit individual animals by removing them from dangerous areas, but does not reduce the impact of the action, such as clearing, on the species. As such, it is not considered to be a mitigation or offset measure for the purposes of EPBC Act assessment. In situ conservation, and habitat augmentation, is the priority for the Department of the Environment, Water, Heritage and the Arts when assessing the impact of habitat loss associated with development proposals.

Glossary

An **action** is defined broadly in the EPBC Act and includes: a project, a development, an undertaking, an activity or a series of activities, or an alteration of any of these things. Actions encompass all stages of a project, as well as alterations or modifications to existing infrastructure.

Fragmentation means to create a disjuncture within habitat with continuous or near continuous canopy, to the extent that remnant habitat patch canopies are no longer directly connected or have more than a 6m break between peppermint trees.

Habitat linkage means any continuous or near continuous native or exotic vegetation that allows animals to move between areas. Linkages can be as fine-scale as continuous or near continuous canopy cover between neighbouring trees.

Persistence refers to the continuing existence or occurrence of the species.

Recovery refers to the restoration or return of the species to healthy and sustainable population levels.

A **significant impact** is an impact which is important, notable, or of consequence, having regard to its context or intensity. Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts.

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