





Guidelines for best-practice management of modified habitats

# Artificial structures

These guidelines are designed to assist land managers to protect and enhance populations of southern brown bandicoots, *Isoodon obesulus* (hereafter SBB), particularly when they occur in modified and/or linear habitats.

When managing areas of SBB habitat, attempts should be made to:

- 1. avoid any impacts on the species in the first instance;
- 2. minimise any unavoidable impacts; and
- 3. establish processes for long-term conservation of the species and their habitat at the site.

These guidelines should be followed in conjunction with any other local land management requirements. They were developed with input from over 60 bandicoot experts, land managers, on-ground practitioners and others at a workshop in November 2018.

management of modified habitats for **Southern Brown Bandicoots** 

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## Artificial structures

- Artificial structures can provide SBB with additional cover and protection from introduced predators although they should not be used to replace the cover provided by dense vegetation.
- Man-made structures can be placed in areas where SBB are known to inhabit, and where natural options for cover or nesting are limited.
- A simple design for a DIY SBB hide is provided below:



 Piles of brush and woody debris can also be used to provide shelter. Use existing, natural woody debris (logs, branches etc.) and place it in piles of at least 1.0m<sup>2</sup> in areas where SBB are known to occur, especially if vegetation cover is lacking.

- Place shelters a maximum of **10m** apart in areas where the vegetation has been cleared to facilitate the movement of SBB between areas of suitably dense vegetation.
- Monitor structures to determine if they are used by SBB.
- Conduct community education/engagement and install signage in areas containing artificial structures.
- Share or publish findings on the usage of artificial structures, especially with respect to size, shape, material used and spacing.



Debris pile - Main Drain - Sarah Maclagan

### For additional information refer to the other Guidelines:

Artificial structures | Fire | Community engagement | Pest animals | Pest plants | Revegetation | Road and rail impacts | Vegetation management





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# Community engagement

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# Community engagement

- Support existing community volunteer groups and SBB friendly gardening groups.
- Encourage local residents to include a 100mm gap at the base of property fencing to allow for the movement of SBB in estates adjacent to SBB Habitat.
- Encourage responsible pet ownership (see Guideline on "Pest & domestic animals").
- Encourage planting of SBB habitat and creation of artificial shelters where appropriate (see Guidelines on "Revegetation" and "Artificial Shelters").
- Provide residents with SBB friendly plant lists and/or vouchers for local indigenous/native plant nurseries.
- Utilise a variety of communication channels such as community drop in sessions, one on one meetings, letterbox drops, public notices on council websites and in local papers and social media vehicles such as Facebook and Instagram.



Bandicoot Night - Kellie Dene

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# Fire

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## Fire

- Reduce fire risk through the considered use of ecological/fuel reduction burns or other suitable biomass reduction strategies to create a mosaic of successional vegetation.
- Conduct patchy fuel reduction burns adjacent to SBB Habitat to reduce the fire risk.
- Minimise the area of reduced understorey following ecological/fuel reduction burns or biomass reduction works.
- Use fire breaks and/or fuel reduction zones to reduce the risk of wild fires spreading through entire patches of known/likely SBB habitat.



Mosaic of Burning Grassland - Neal Masters

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# Pest & domestic animals

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## **Domestic Animals**

- Dogs and cats can prey on bandicoots (juvenile bandicoots are particularly susceptible to cats).
- Adopt domestic animal exclusion zones:
  - Within 1 km of SBB habitat in urban-fringe areas; and
  - Within 2.4 km of SBB habitat in rural areas
  - Where this is not possible, enforce or encourage confinement of domestic animals to private properties.
- Conduct community engagement and education sessions to garner support for responsible pet ownership and pest control programs.
- Create opportunities for the community to continue to be involved through attending ongoing forums or through providing ongoing feedback.



Cat with baby bandicoot - Sarah Maclagan

## **Pest Animals**

- Erect predator exclusion fencing where possible to protect important SBB Habitat.
- Establish an integrated pest control program with a strong collaborative approach between stakeholders, including land managers and local experts.
- Continued for at least 4 years and include long-term monitoring.
- Control programs that target feral foxes, cats, rabbits and rats simultaneously have the greatest success.

**Foxes** – 1080 baiting (SBB tolerant) or soft jaw trapping.

- Bury 1080 and tether baits to a depth of **8-10cm**.
- Conduct pre-baiting trials, with non-toxic baits buried at marked stations, to identify non-target species at risk.
- Soft jaw trapping may be preferred near residential areas to reduce risks to dogs.

**Feral Cats** – use baited cage traps and enforce cat-free residential estates wherever possible.

**Rabbits** – 1080 baiting placed within **25m** of rabbit warrens and destruction of warrens if possible.

- Warren fumigation is not ideal due to SBB use of rabbit burrows.
- Pindone baits are not suitable due to SBB susceptibility.

**Rats** – secure baits on elevated surfaces so that SBB cannot reach them (SBB are susceptible to rat poison but do not climb as rats do).

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# Pest plants

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## Pest Plants

- Identify pest plant species present at a site and check legal obligations to remove them.
- Pest plant species such as blackberry, gorse, flax-leaf broom, boneseed and African boxthorn provide dense, prickly cover and are often used by SBB for shelter and/or food.
- Conduct surveys of SBB usage of areas containing pest plant species to assess the habitat value where the infested area:
  - is greater than 25m<sup>2</sup> in size;
  - occurs within 50m of potential SBB habitat; or
  - contains an understorey vegetation structure of >50% average foliage density in the 0.2-1m height range.
- Ideally, establish suitable vegetation nearby before clearing of pest plant species commences.
- Stagger/stage removal of pest plant species and replace with indigenous / native alternatives over time, while ensuring >50% understory vegetation remains at all times.
- Avoid creating gaps >7m as these may hinder SBB movement.
- Use targeted spot-spraying, 'wiping' or cut and paint methods rather than spraying more broadly in areas known/likely to provide SBB habitat.
- Herbicide spraying is acceptable in areas
  >30m from known/likely SBB habitat.

- Implement a rapid intense revegetation program following weed removal using bandicoot-suitable plant species, ensuring a high plant density in the understorey to prevent the re-growth of weeds.
- If present, remove pine trees and Sweet Pittosporum, as these suppress the growth of understorey/ groundcover vegetation.
- Only a medium to long-term approach to pest plant management will deliver success, so ensure adequate funding is provided for ongoing monitoring and maintenance works.
- Work collaboratively with adjacent landholders to prevent the re-introduction of pest plant species from adjacent land.
- Implement strict hygiene procedures on maintenance and construction vehicles, machinery, personnel and during revegetation projects to reduce the spread of pest plant species.
- When unable to remove pest plant species, prevent pest plant species from spreading by containing existing infestations.

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# Revegetation

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### Revegetation

- Aim to provide dense groundcover with **>50%** average foliage density within the **0.2-1 m** height range.
- Consult with the local community to determine their expectations and willingness to get involved in planting and maintenance activities.
- Consider and budget for the use of mulch and/or jute matting to suppress weed competition while the new vegetation establishes.
- Ensure any revegetation works are followed up with a weeding and watering program that lasts for at least 24 months from planting to ensure the successful establishment of new habitat.
- Allow for a contingency planting of 20% in any revegetation project to replace any plants that fail during the first two years.
- Consider other local animal and plant species' requirements to maximise biodiversity outcomes.
- Where invasive weed species like blackberry or gorse are to be replaced, use native prickly shrubs that are indigenous to the area and/or those recommended in **Table 1**.

#### **Plant advice**

- Use indigenous plant species whenever possible.
- Contact your local indigenous plant nursery and visit your council website for advice on plant selection.
- Refer to **Table 1** for a list of recommended bandicoot-friendly plant species.
- Assess local conditions and soil types to identify the most suitable indigenous plants for the specific location.

#### **Provide connectivity corridors**

- Corridors should be as wide as possible to maximise habitat potential. Ideally, they should have a minimum width >10m, but a width of 30m or greater is better.
- Corridors as narrow as 5m wide still have some value for SBB and should be provided wherever possible.

Table 1 – Native plant species recommended for inclusionin revegetation projects to create or restore habitatfor Southern Brown Bandicoot. Use indigenous formswherever possible.

| Structural Group  | Common Name   | Genus/Species  |
|---|---|--|
| Understorey<br>(0-1m)<br>Planted densely<br>to achieve required<br>50%–80% cover. | Berry Saltbush<br>Spear Grasses<br>Tall Sedge Carex apressa<br>Pale Flax Lily<br>Black Anther Flax Lily<br>Rounded Noon Flower<br>Nodding Saltbush<br>Ruby Saltbush<br>Knobby Club Rush<br>Thatch Saw Sedge<br>Rushes<br>Sword-sedges<br>Spiny Headed Mat Rush<br>Weeping Grass<br>Tussock Grasses<br>Native Raspberry<br>Wallaby Grasses<br>Kangaroo Grass<br>Small Grass Tree | Atriplex semibaccata<br>Austrostipa spp.<br>Carex apressa<br>Dianella longifolia<br>Dianella revoluta<br>Disphyma crassifolium<br>Einadia nutans<br>Enchylaena tomentosa<br>Ficinia nodosa<br>Gahnia radula<br>Juncus spp.<br>Lepidosperma spp.<br>Lomandra longifolia<br>Microlaena stipoides<br>Poa spp.<br>Rubus parvifolius<br>Rytidosperma spp.<br>Themeda triandra<br>Xanthorrhoea minor |
| Understorey<br>(1-2m)   | Health Wattle<br>Common Appleberry<br>Rock Correa<br>Common Correa<br>Red Fruited Saw Sedge<br>Hop Goodenia<br>Rosemary revillea<br>Purple Coral Pea<br>Seaberry Saltbush   | Acacia brownii<br>Billardiera scandens<br>Correaq glabra<br>Correa glabra<br>Gahnia sieberiana<br>Goodenia ovata<br>Grevillea rosmarinifolia<br>Hardenbergia violacea<br>Rhagodia candolleana  |
| Mid-storey  | Prickly Moses<br>Hedge Wattle<br>Hairpin Banksia<br>Riber Bottlebrush<br>Small Leaved Clematis<br>Sticky Hop Bush<br>Bushy Needlewood<br>Yellow Hakea<br>Burgan<br>Prickly Tea Tree<br>Silky Tea Tree<br>Tree Violet<br>Swamp Paperbark   | Acacia verticillata<br>Acacia paradoxa<br>Banksia spinulosa<br>Callistemon sieberi<br>Clematis microphylla<br>Dodonea viscosum<br>Hakea decurrens<br>Hakea nodosa<br>Kunzea ericoides<br>Leptopermm continentale<br>Leptospermum myrsinoides<br>Melicytus dentatus<br>Melaleuca ericifolia   |
| Over-storey<br>(>4m)  | Silver Wattle<br>Lightwood<br>Black Wattle<br>Blackwood<br>Golden Wattle<br>Black Sheoak<br>Drooping Sheoak<br>Silver Banksia<br>Coast Banksia<br>Saw Banksia<br>Sweet Bursaria<br>Gums   | Acacia dealbata<br>Acacia implexa<br>Acacia mearnsii<br>Acacia melanoxylon<br>Acacia pycnantha<br>Allocasuarina littoralis<br>Allocasuarina verticillata<br>Banksia marginata<br>Banksia integrifolia<br>Banksia serrata<br>Bursaria spinosa<br>Eucalyptus spp.  |

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# Road and rail impacts

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## Road and rail impacts

- Conserve road/rail corridor vegetation wherever possible to provide habitat for SBB.
- For roads with adjacent SBB habitat, reduce speed limits, install speed humps/traps or erect appropriate signage to highlight conservation significance.
- Where necessary, install small gauge fences along roads/rail corridors (25x25mm gauge) that lead to or end at a crossing point (underpass/overpass). SBB move freely through 50mm diamond mesh fencing.
- Fencing may not be appropriate if it: fragments habitat, reduces connectivity, isolates SBB populations, prevents movement during critical periods (fire events), leads to entrapment of any species, funnels species towards roads/rail corridors, leads to mortality or blocks escape routes.
- Provide alternative crossing points such as underpasses, tunnels, pipes or culverts beneath road/rail corridors to assist with SBB connectivity.
  - >300mm diameter recommended. Limit length to encourage SBB usage.
  - Limit the length of crossing structures where possible to encourage SBB usage.
  - If longer than 30m in length provide light and drainage openings.
  - Provide woody structures, thick, dense vegetation at entrances and implement a predator control program.
  - Consider the use of wooden bridging structures within culverts to allow for SBB movement when culvert is flooded. Bridging structures should be square sided (not rounded) and be approximately 200mm wide.

- Any gaps in vegetation should be no greater than
  7m along road/rail corridors whenever possible.
- Monitor effectiveness of mitigation measures (before, during and after) and modify as necessary.
- Use peer reviewed journals and Australasian Network for Ecology & Transportation (ANET) when planning and designing structures and when reporting monitoring results.



SBB Crossing Structure - Amanda Breidahl



Cranbourne Botanic Gardens

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# Vegetation management

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# Vegetation management

- SBB require dense groundcover vegetation with >50% average foliage density within the 0.2-1m height range.
- Aim to maintain habitat connectivity for SBB by avoiding gaps >7m wide.
- Where grassy vegetation needs slashing/mowing, retain a >3m wide contiguous strip of cover to allow for SBB movement.
- Limit stock grazing and vehicle access in areas of vegetation likely to provide habitat for SBB.
- Provide buffer zones of suitable dense vegetation
  >10m wide between developments and known or likely SBB habitat.
- SBB are often slow to move from the path of vehicles/ machinery. Where vehicles/machinery are required to move through SBB habitat, they should not exceed a speed of 5km/hr (i.e. walking speed) to allow animals a greater chance of moving out of their path.
- To "push" SBB towards suitable habitat, any vegetation slashing or clearing should be done in a pattern that maintains connectivity of habitat for as long as possible and avoids creating isolated patches (i.e. strip or zig-zag pattern).



Slashing in the Rail Corridor - Katrina Lewis

- Where possible, cutting blades should be set at a height of **20cm** or higher, to avoid the chance of blades striking SBB.
- Where substantial vegetation is being removed, provide artificial structures to provide alternative refuge for SBB (see Guideline on "Artificial Shelters").

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