

Recovery of quokkas following a large scale and intense wildfire in the southern forest, Western Australia

Contact: Dr Karlene Bain, Wildlife Ecologist, Python Ecological Services/ WWF-Australia; PH: 0428 323 760; email draconis@wn.com.au

Background

The quokka is a medium-sized mammal with a geographic range that has dramatically declined since European settlement (Kitchener 1995, Hayward *et al.* 2003; Woinarski *et al.* 2014). This species is best known from Rottnest Island, where it is abundant but genetically depauperate (Sinclair 2001; Alacs *et al.* 2011). However, the species also occurs on the mainland of Western Australia where it was once common but is now classified as vulnerable under the Australian *Environment Protection and Biodiversity Conservation Act 1999* and as 'fauna that is rare or likely to become extinct' under the State's *Wildlife Conservation Act 1950*. Populations on the mainland include those in the northern jarrah forest between Perth and Collie, the Muddy Lakes area on the Swan Coastal Plain, the southern forest between Nannup and Denmark, and disjunct reserves north and east of Albany on the south coast (Sinclair 1998; de Tores *et al.* 2008; Sinclair and Hyder 2009; DEC 2013). The southern forest supports the most extensive remaining quokka population on the mainland, and the most genetically diverse population of the species (P. Spencer unpublished data).

Quokkas in the southern forest routinely move between 0.5 km and 10 km in a night within stable home ranges and have been recorded dispersing more than 14 km to establish new home ranges (Bain 2015), so movement across large distances is possible. However Bain *et al.* (2016) suggest that the quokka generally avoids movement through open habitat, possibly due to vulnerability to predation and thermoregulation requirements. They also suggest that large scale and intense fires reduce the ability of quokkas to move between suitable habitat patches and may result in temporary habitat fragmentation.

The Northcliffe fire was approximately 98,000 ha and burnt under intense conditions across much of this area, removing all vertical vegetation structure and leaving minimal unburnt refuge patches. The fire burnt at a scale that is considered large for this region and affected a significant proportion of critical habitat for the southern forest population of the quokka. The Northcliffe fire is likely to have resulted in significant habitat fragmentation for quokkas in the southern forest and it is important that recolonisation patterns and factors limiting recovery are understood to enable effective management (or restoration) of the functional metapopulation in this area.

The quokka is one of the 20 priority mammal species targeted for conservation and recovery under the Australian National Threatened Species Recovery Program. WWF -Australia also recognise the national importance of the southern forest population of the quokka and have identified them as a priority in their strategic plan and are actively raising funds for this project. The Western Australian Department of Parks and Wildlife (Parks and Wildlife) is responsible for the conservation and management of the quokka population in southern forests. As such, this project will be conducted in close collaboration with Parks and Wildlife and WWF.

Key objectives:

Improve our understanding of recolonisation patterns and the factors limiting quokka recovery following a large-scale, homogenising fire.

Project

1. Investigate the relationships between spatial use patterns and factors that may limit recovery and movement in a post-fire environment – e.g. refuge patch size and configuration, vegetation structure, food resources, water availability, feral pig damage, predator activity.

Approaches for collection of relevant data include: telemetry, camera grids and habitat data collections

2. Investigate the role that predators play in limiting movement of quokkas out of refuge areas following fire.

Approaches for collection of relevant data could include: telemetry, camera trap based predator-prey data collections relevant to spatiotemporal overlaps, occupancy surveys, predator scat analysis.



Figure 1. a) an example of the eucalypt forests occupied by quokkas in the southern forests, b) a family of quokkas surviving in the Northcliffe fire area (photograph: K.Bain)

References

Alacs, E. A., Spencer, P. B. S., Tores, P. J., and Krauss, S. L. (2011). Population genetic structure of island and mainland populations of the quokka, *Setonix brachyurus* (Macropodidae): A comparison of AFLP and microsatellite markers. *Conservation Genetics* **12**, 297-309

Bain K (2015) The ecology of the quokka (*Setonix brachyurus*) in the southern forests of Western Australia. PhD dissertation, University of Western Australia, Perth, WA.

Bain, K., Wayne, A., and Bencini, R. (2016). Prescribed burning as a conservation tool for management of habitat for threatened species: the quokka (*Setonix brachyurus*) in the southern forests of Western Australia. *International Journal of Wildland Fire* **25**, 608-617

de Tores, P., Burbidge, A., Morris, K., and Friend, T. (2008). *Setonix brachyurus*. In 'IUCN 2013. IUCN Red List of Threatened Species. Version 2013.2'. Available at <http://www.iucnredlist.org>.

Department of Environment and Conservation (2013). 'Quokka (*Setonix brachyurus*) Recovery Plan. Western Australian Wildlife Management Program No. 56'. (Department of Environment and Conservation: Western Australia).

Hayward, M. W., de Tores, P. J., Dillon, M. J., and Fox, B. J. (2003). Local population structure of a naturally occurring metapopulation of the quokka (*Setonix brachyurus* Macropodidae: Marsupialia). *Biological Conservation*, **110**, 343-355.

Kitchener, D. J. (1995). Quokka (*Setonix brachyurus*). In: 'The Mammals of Australia, Second Edition.' (Ed R. Strahan.) pp 401-403. (Australian Museum and Reed New Holland: Sydney.)

Sinclair, E. A. (1998). Morphological variation among populations of the quokka, *Setonix brachyurus* (Macropodidae: Marsupialia), in Western Australia. *Australian Journal of Zoology* **46**, 439-449.

Sinclair, E. A. (2001). Phylogeographic variation in the quokka, *Setonix brachyurus* (Marsupialia: Macropodidae): implications for conservation. *Animal Conservation* **4**, 325-333.

Sinclair, E. A., and Hyder, B. M. (2009). Surviving quokka (*Setonix brachyurus*) population on the Swan Coastal Plain, Western Australia. *Australian Mammalogy* **31**, 67-69.

Woinarski, J., Burbidge, A., Harrison, P. (2014). 'The Action Plan for Australian Mammals 2012.' (CSIRO Publishing: Victoria.)



Department of **Biodiversity,
Conservation and Attractions**

