

Cross-fostering the endangered Victorian Brush-tailed Rock Wallaby for reintroduction to the wild: saving “The Shadow”

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Once abundant and widespread throughout suitable habitat in south-eastern Australia; Brush-tailed Rock-wallabies *Petrogale pencillata* are now restricted to fragmented populations in southern Queensland, New South Wales and Victoria. Many factors are thought to have contributed to the continued decline of Brush-tailed Rock-wallabies, including hunting, predation by foxes, competition for food and shelter, weed invasion, changes in fire regimes, drought and disease – factors common to the decline of many Australian small mammals.

Genetic research on Brush-tailed Rock-wallabies has indicated that the current population can be divided into three distinct groups: a northern group encompassing south-eastern Queensland and north-east New South Wales - the most numerous with a total of approximately 10 to 20,000 animals; a central group extending south of the Hunter River to south-east New South Wales, numbering less than 800-900 animals; and a southern or Victorian group comprising the Victorian animals, with only 20 or so animals remaining in the wild in Victoria.

As a result the Brush-tailed Rock-wallaby is listed as "Critically Endangered" in Victoria, "Endangered" in New South Wales and "Vulnerable" in Queensland.

Pre-1900, the brush-tailed rock-wallaby was abundant throughout rocky habitats of Victoria and numbered in the millions. By the early 1920s, more than a million brush-tails had been shot for the fur trade and never recovered, so combined with threats of predation from foxes, competition, habitat modification and degradation, disease, climatic changes and stochastic events saw the species regarded as extinct in Victoria by 1916. Fortunately, the species was not lost altogether - it was rediscovered at two sites in the state in the mid 1900s (Grampians National Park and upper reaches of the Snowy River in East Gippsland).

There are currently three known wild colonies of Victorian brush-tailed rock-wallabies in the southern Ecological Significant Unit (ESU). All are located in East Gippsland (Farm Creek, Little River and West Gully). These populations are monitored regularly by the Victorian Brush-tailed Rock-wallaby Recovery Team, which was formed in 1996. Combined, the wild population of the three sites is estimated at less than 30, including a captive-bred male released in 2005 (a second male released at the same time was found dead six months after being released).

As part of the National Recovery Program, a captive breeding program had commenced in 1996 with the aim of increasing numbers for reintroduction to the wild.

In 1999, survey work identified there was only one remaining Brush-tailed Rock wallaby in the Grampians National Park, and the Recovery Team's recommendation was that this individual be captured to join the safety of the captive colony. Living up to the species' nickname 'The Shadow' - although observed up close and photographed which determined the animal was a female - she proved difficult to trap and more than 300 trap nights were spent before she was finally captured on 21 December 1999.

For this species a captive breeding technique was optimized, which had not been previously used in the recovery of any other threatened marsupial species. This specialised technique, known as cross-fostering, involves the transfer of a pouch young from a threatened species into the pouch of a surrogate mother from a similar common species. A surrogacy program to increase the reproductive rate of the critically endangered Victorian brush-tailed rock wallaby (BTRW) - initially developed in semi-captive conditions - was established in close captivity at Adelaide Zoological Gardens. Pouch young were removed from their mothers on days 8-20 or 40-45 after parturition and placed onto the teat of a tammar wallaby (*Macropus eugenii*) or yellow-footed rock wallaby (*Petrogale xanthopus xanthopus*) surrogate mother that had young at a similar stage of lactation, and of a similar age and size (Taggart et al., 2005).

However, as Tammar Wallaby females only cycle between January and the end of June, use of this species as surrogates was phased out. The Yellow-footed Rock-wallaby (YFRW) was therefore determined the most suitable as it is a close relative of the BTRW; females are around the same size in both species; female YFRW's breed year round and they can also be maintained in large breeding groups. Cross-fostering trials between BTRW and YFRW commenced in 1998 at Adelaide Zoo and were completed in 1999. Growth curves for pouch young on mothers and surrogate mothers were estimated. BTRW young reared by surrogate mothers grew at a similar rate, and were weaned at a similar age, to the pouch young of the foster species. Like other rock-wallaby species, *P. penicillata* underwent embryonic diapause and had a gestation period of similar to 30 days. Permanent pouch exit occurred at similar to 200 days and young became sexually mature at similar to 23 months for males and no later than 21 months for females. These trials clearly demonstrated that BTRW pouch young, as small as 1 g (similar to 8 days old), can be removed and cross-fostered successfully (Taggart et al., 2005).

Refined by staff at Adelaide Zoo, changes to the program following the trials significantly reduced the early mortality of cross-fostered young, included 1) the early transfer (between days 8 and 20) of brush-tail pouch young from mother to surrogate mother, 2) review of the veterinary history and health of the animals selected to act as surrogate mothers, and 3) increased access to grazing pasture for foster mothers (Schultz et al, 2006). These procedures can be used to accelerate breeding and recruitment by up to six times in this threatened species provided an adequate source of surrogate mothers is available.

Originally, pouch young not only came from BTRW females at Adelaide Zoo but were also flown in from other Recovery Team institutions such as Healesville Sanctuary, Tidbinbilla Nature Reserve in the ACT, and Waterfall Springs in NSW. Now, most come from breeding groups at Tidbinbilla and Waite Institute in South Australia, and are transferred into yellow-footed rock-wallabies held at Adelaide Zoo, Waite and Tinbinbilla.

The National Recovery Program's Recovery Actions are to:

- Identify potential sites for reintroduction / translocation of Brush-tailed Rock-wallabies
- Undertake captive breeding for reintroduction or population reinforcement
- Control introduced animals (predators and competitors)
- Identify fire management priorities and develop detailed plan
- Monitor and survey habitat, threats, and Brush-tailed Rock-wallaby populations
- Conduct priority research projects

- Increase community awareness and support

After much assessment, a site in the Grampians National Park was identified as a suitable location for the release of Victorian brush-tailed rock-wallabies from the captive population. Dunkeld Pastoral Company has established a large pre-release 'hardening off' enclosure where wallabies are housed prior to release. Tinbinbilla Nature Reserve also holds pre-release animals in large naturalistic enclosures.

On 12 November 2008 – almost 10 years after the removal of the last known BTRW from the Grampians – 10 animals (and a pouch young) were released at 3 locations in the Moora Moora Creek in the Serra Range area of the Grampians for a trial reintroduction. This area comprised more than 88 hectares of suitable habitat, 4.25km of cliff line and flowing water within 100m of the release site. 2 family groups of 1 male and 3 females, who were 'hardened off' at Tinbinbilla Nature Reserve and Dunkeld, along with a batchelor group of 2 also held at Dunkeld, formed this historic release. All 10 animals were fitted with radio-collars to follow their movements and have been intensively monitored. Of the 10 released animals, seven were still alive and doing well eleven months after release.

On 8 October 2009, a further five brush-tailed rock-wallabies were released into the Grampians to supplement the seven animals from the first reintroduction. And in spring 2010, 2 females and three males were also released within the existing colony. The first wild-born joey (a male) was seen during trapping in autumn 2010, with others also now having bred.

Many studies on these reintroduced animals have been, and are still being carried out. A study by Schultz et al (2011) looked at the issue of the health of reintroduced animals, which has received little attention despite the potential impacts of poor animal health on the overall success of the reintroduction and potential risks to the host environment. In all, 21 animals have been released at the Grampians, with data collected from all sites (captive, hardening-off and reintroduced). At each site animals were periodically trapped, anaesthetised, physically examined, weighed, and blood sampled for haematological and biochemical data over three calendar years. All reintroduced animals were radio-collared.

Other studies have looked at the home range of reintroduced animals (Molyneux et al, 2011), and a PhD research project is currently in place to help better understand the use of habitat by the wallabies and the need for fire management to provide food resources.

Although the captive population is now breeding well, and cross-fostering is increasing the numbers of BTRW, there have been many setbacks to the program. In 2003 devastating bushfires destroyed all of the Victorian animals and breeding facilities at Tinbinbilla Nature reserve; however the wild population in East Gippsland survived. Severe rain in the Grampians in summer 2010/2011 caused many rock falls and roads were blocked for months, which impacted on access to and around the site, resulting in fox baiting not being able to be conducted for months, which may have contributed to predation issues associated with the loss of some animals.

As at mid December 2011, 22 brush-tailed rock-wallabies have been released into the Grampians National Park. Of these 13 are dead, 5 missing and 4 known to be alive, plus juveniles.

Four deaths have been attributed to predation, 3 to infection (osteomyelitis and infection from cut on leg), 2 to anthropogenic causes, 2 to environmental (one was crushed in a cave when the roof collapsed; one from a fall from rocks), and 2 unknown causes.

Although these losses have been disappointing, the team involved has learned much from this and with a further 8 females due to be released over the next 3-4 years, hope is that there is indeed a brighter future for 'The Shadow' in the Grampians National Park

Final comment comes from Dr David Schultz, one of the driving forces behind this program:

“There is a percentage of the population that don't like extinction, and we want to do something about it. There's a lot of people who put a lot of time and effort into it, for a rather ethereal concept that we just don't like things disappearing out of the wild. I mean ultimately once you start taking things out of the ecosystem, the ecosystem goes down the tube.”

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