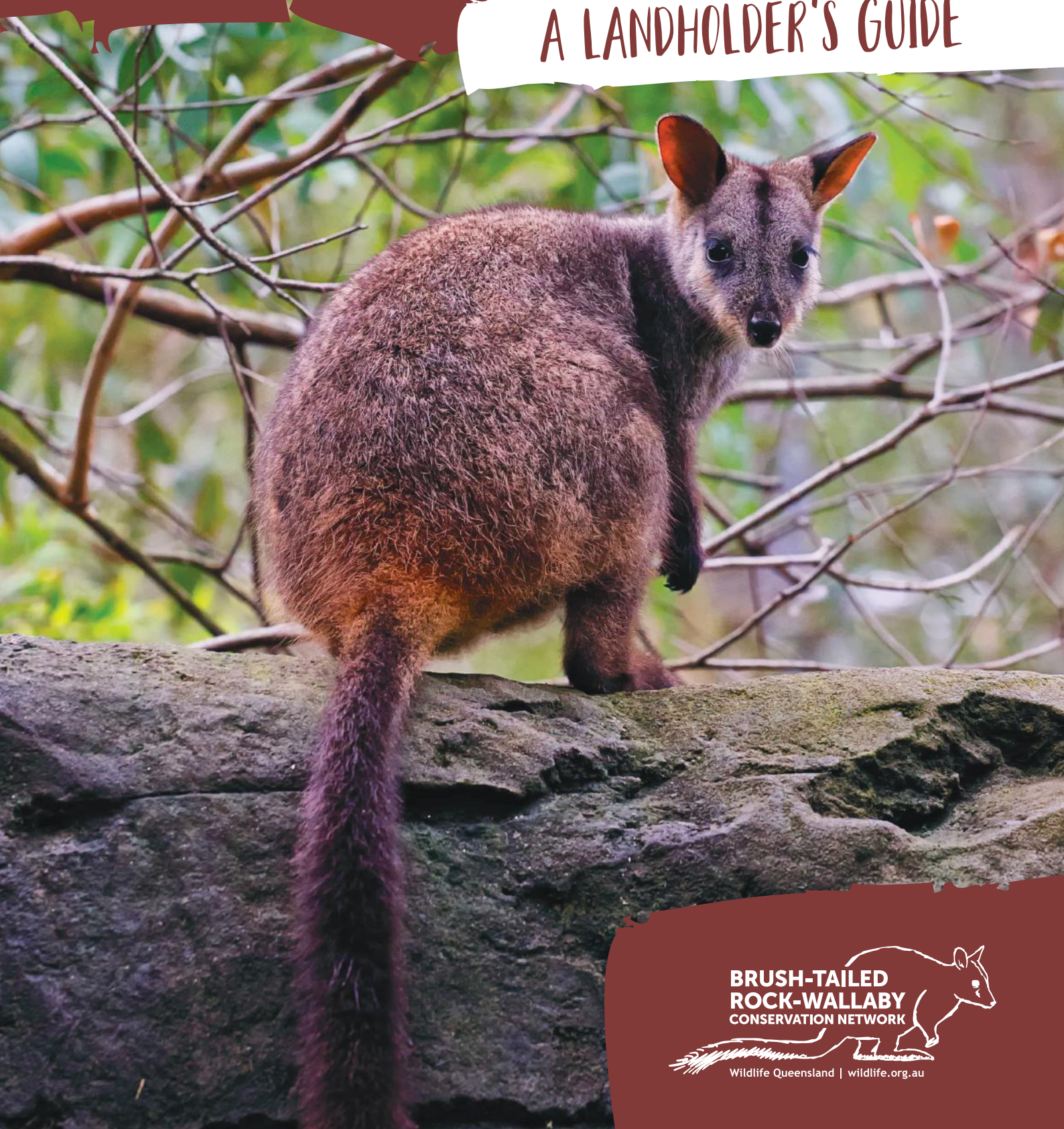


SAVING THE BRUSH-TAILED ROCK-WALLABY

A LANDHOLDER'S GUIDE



**BRUSH-TAILED
ROCK-WALLABY**
CONSERVATION NETWORK



Wildlife Queensland | wildlife.org.au



Acknowledgements

This publication is supported through funding from the Australian Government.

© Wildlife Queensland's Brush-tailed Rock-wallaby Conservation Network (BTRWCN)

Permission is required to use this publication in advertising or in a product for sale; to modify the publication; or to republish the publication online. While the information included is correct at the time of writing (October 2022), users are reminded to stay up-to-date with rock-wallaby research.

Email: btrwproject@wildlife.org.au

Produced by Wildlife Queensland's Brush-tailed Rock-wallaby Conservation Network

Text by Paul Revie & Karin Cox

Edited by Karin Cox

Design by Paul Hodge www.hodge.net.au

PHOTOGRAPHY

Front cover: © Pominoz/Dreamstime

Inside front cover: © Karin Cox © Paul Hodge (flora)

p. 1: © imageBROKER/Alamy Stock Photo

p. 2: © Rafael Ben Ari/Dreamstime

p. 3: © Wildlife Queensland; © Steve Parish (etch);
© Dreamstime (inset)

p. 4: © Paul Revie; © Wildlife Queensland (inset top left)
© Dreamstime (inset bottom)

p. 5: © Nature Picture Library/Alamy Stock Photo (top left);
© Auscape International Pty Ltd/Alamy Stock Photo
(inset top right); © Isselee/Dreamstime (bottom, etch)

p. 6: © Tracie Louise /Getty Images Signature (top); © John
Carnemolla /Dreamstime (bottom, etch)

p. 7: © Brett Critchley/Dreamstime (top);
© SWallace5/Dreamstime (bottom, etch)

p. 8: © Steve Parish (top); © Karin Cox (bottom)

p. 9: © Wildlife Queensland (inset); © Wildlife Queensland
(top); © Ken Griffiths/Dreamstime (bottom).

p. 10: © John Carnemolla/Dreamstime (top)

p. 11: © Showface/Dreamstime (top); © Lukas Vejrik/
Dreamstime (bottom)

p. 12: © Wildlife Queensland (inset top);
© Iprintezis/Dreamstime (bottom left, inset)

p. 13: © Wildlife Queensland (top); © Steve Parish (bottom)

Back cover: © Tracie Louse/Canva: Getty Images Signature

About this guide

This guide is designed to assist land managers and property owners to protect, re-create and enhance habitat for the brush-tailed rock-wallaby (*Petrogale penicillata*). It outlines the ecology of the species and its threats, and it explains the actions needed to restore habitat quality and connectivity, reduce the risks from pest animals and plants, and minimise fire impacts.

While the actions outlined in this guide are specifically tailored to the brush-tailed rock-wallaby, the benefits of these measures extend beyond this species. Habitat restoration, pest and weed control, and ecological prescribed burns benefit a suite of native fauna, ultimately serving to protect Australia's unique biodiversity in a rapidly changing environment.

Australia's rock-wallabies need careful management if they are to survive. Key actions include controlling introduced predators and competitors, prescribed burning to prevent severe bushfires, weed control, and habitat expansion and augmentation.

SAVE AUSTRALIA'S nimble little rock-hoppers

Mainland Australia is home to at least 17 species of rock-wallaby, most of which inhabit northern and inland Australia. These stocky marsupials are perfectly adapted to the gorges, escarpments, outcrops and boulder piles they call home.

Of the known rock-wallaby species, 7 are currently listed as threatened under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, with several more subspecies at risk.



■ *Petrogale penicillata*

Found along the Great Dividing Range, from Yarraman in Queensland to the Grampians in Victoria, the brush-tailed rock-wallaby is divided into three genetically distinct evolutionarily significant units (ESUs). Pictured is a southern representative from the Jenolan Caves population in New South Wales.

RANGE & HABITAT


The brush-tailed rock-wallaby is now listed as Vulnerable in Queensland and nationally, but it was once among the most abundant macropods in south-eastern Australia.

Local extinctions began soon after European settlement, when these rock-wallabies were historically hunted for their pelts and as agricultural pests.

Habitat loss and fragmentation, competition for food with goats and cattle, predation from introduced carnivores, intense bushfires, weed incursion, and disease added to their woes. By the 1920s, the species was becoming rare in most areas. Some populations in Victoria

and southern New South Wales are now nearly locally extinct, and the species persists only in isolated colonies in the north of its range. Over the past 20 years, many smaller colonies have disappeared. A population of brush-tailed rock-wallabies formerly known to inhabit the crags and caves of Lamington National Park, on the Queensland–New South Wales Border, is now considered locally extinct. Declines continue in most subpopulations.

Today's low population of brush-tailed rock-wallabies is largely due to historical hunting for fur, meat, and as a perceived agricultural pest. More than 500,000 rock-wallabies were killed between 1894 and 1914, with almost 100,000 skins marketed by a single company in 1908. While hunting is no longer a threat, the practice led to the disappearance of rock-wallabies in many areas. The resultant low numbers left rock-wallabies vulnerable to predation and competition, which continue to exert pressure and prevent recovery to historical population levels.



Rock-wallabies prefer complex, rugged habitats that provide shelter from predators and allow them to avoid extremes of heat and cold.

Vegetation close to rocky habitats receives shade and water runoff, encouraging greater plant diversity and allowing for extended periods of growth, even during droughts.

Of the estimated total brush-tailed rock-wallaby population of 15,000 to 30,000 individuals, around 20% are thought to occur in Queensland. The inaccessibility of their favoured habitats means new populations are still being discovered.

Important populations exist in national parks, state forests, council reserves, and private lands around Crows Nest, Main Range, Moogerah Peaks, Mount Barney, Flinders Peak and Glen Rock National Parks.

Preferred habitats for brush-tailed rock-wallabies occur in various vegetation types, including wet and dry sclerophyll forest, open woodland and even rainforest. Three major categories of rocky habitat are recognised: (1) cliffs featuring caves, ledges and overhangs; (2) loose piles of large boulders with a network of crevices, holes and passageways; and (3) isolated rocky outcrops, often with a fringe of fallen boulders.



Perseverance Dam at Crows Nest, Qld, is a known hotspot for these wallabies.



Several of Queensland's rock-wallaby species have a white cheek stripe and a dark forehead stripe, but the combination of these with shaggy rufous-brown fur, darker front paws and feet and a long, bushily furred dark tail that curves up at the tip when this wallaby hops distinguishes this species. Males (left) are slightly larger than females (right) with a richer colour and more muscular forelimbs.

Identification & LIFESTYLE



Above: Distinctive cylindrical scat terminating in a definite point are often the only indicator that this wary rock-wallaby inhabits an area.

Rock-wallabies generally prefer rugged, boulder-strewn habitats that are inaccessible to humans. Their incredible agility in treacherous terrain stems from their wide, granulated foot pads and long, flexible tails, which provide grip and balance respectively.

Brush-tailed rock-wallabies are medium-sized macropods weighing 5–11 kg. As their name suggests, the tail is generally bushy, although less noticeably in northern populations.

The body is reddish-brown above and lighter beneath, while the darker head features a pale cheek stripe.

In the north of their Queensland range, brush-tailed rock-wallabies may hybridise with Herbert's rock-wallaby (*Petrogale herberti*), which is distributed as far north as Rockhampton. Herbert's rock-wallaby is said to be less rufous and typically greyer in colour with a less shaggy tail.

*Right: The swamp wallaby (*Wallabia bicolor*) and the brush-tailed rock-wallaby can appear superficially similar, although the swamp wallaby has a distinct hopping gait and its long, dark tail is less bushy.*





Right: Like all marsupials, joey rock-wallabies are born in a tiny, underdeveloped state. These 'pinkies' clasp onto a teat in the mother's pouch until they grow fur and become large enough to leave the pouch at about six months of age.



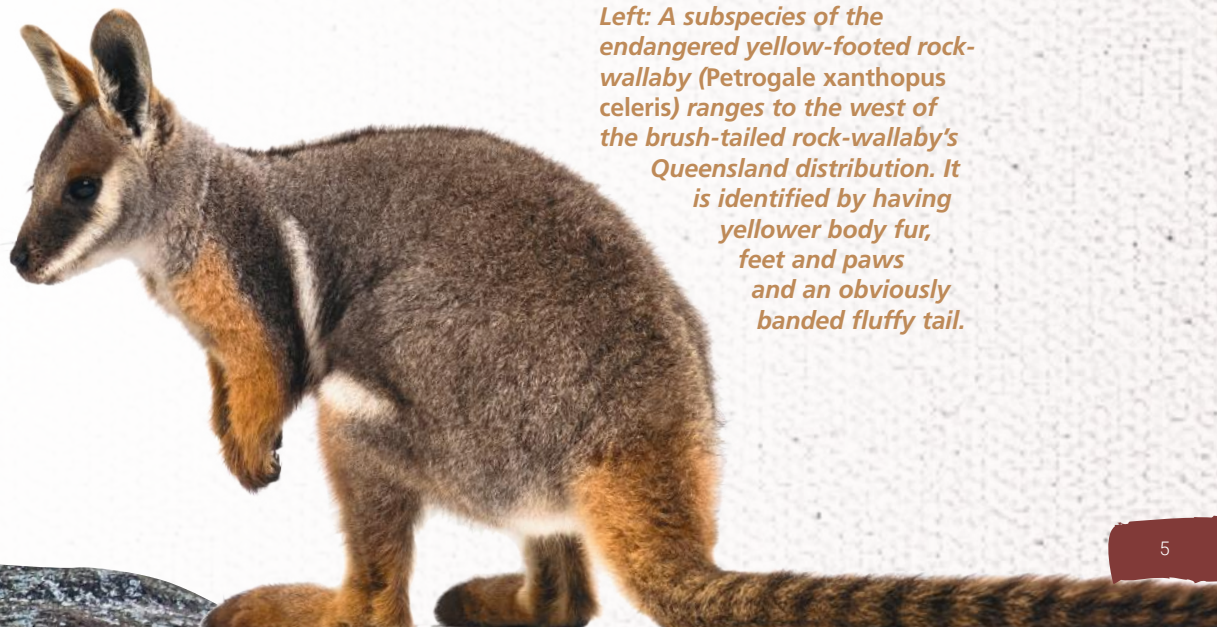
Fragmentation means brush-tailed rock-wallabies are unable to move between colonies when they disperse from their mothers, leading to inbreeding. Following environmental disasters like bushfires, inbreeding can result in the loss of individual colonies.

Above: Female brush-tailed rock-wallabies usually breed once annually, and births peak in most colonies in autumn, when food is most available. Larger males mate with multiple females, but females mostly keep the same mate for several years until he disappears from the colony. These rock-wallabies can live for up to 14 years, although the average life span is just 8 years.

Brush-tailed rock-wallabies are social animals, living in colonies of just a handful of individuals to over a hundred. At sunset, they travel up to 500 m to their favoured foraging areas, which are often smaller than 3 ha. Their generalist diet mainly features grasses, shrubs and herbs, although fruit, bark and fungi

may also be consumed. Foods vary with the seasons. Grass is preferred during wetter times of the year, while browse is more important in drier months. This adaptable feeding allows rock-wallabies to survive droughts or the aftermath of fires by feeding on the foods that are most readily available.

*Left: A subspecies of the endangered yellow-footed rock-wallaby (*Petrogale xanthopus celeris*) ranges to the west of the brush-tailed rock-wallaby's Queensland distribution. It is identified by having yellower body fur, feet and paws and an obviously banded fluffy tail.*





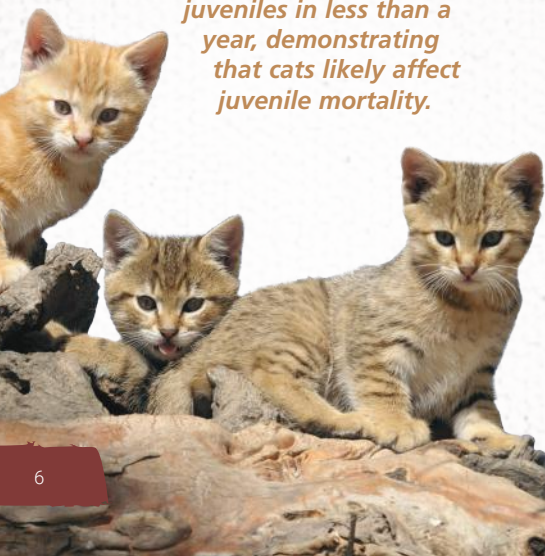
THE PROBLEM

Given their relatively small body size, rock-wallabies are susceptible to predation by red foxes, wild dogs and feral cats. The European red fox was introduced to Australia in the 1870s for sport hunting purposes. Feral cats became established in the wild soon after European arrival, with intentional releases persisting to this day.

YOU CAN HELP BY

CONTROLLING CATS & FOXES


*Below: Adult brush-tailed rock-wallabies grow larger than the preferred prey size for foxes and cats, but joeys are vulnerable to predation. At an allied rock-wallaby (*Petrogale assimilis*) colony near Townsville, a single feral cat killed almost half of all juveniles in less than a year, demonstrating that cats likely affect juvenile mortality.*



Cats don't just directly prey upon native animals, they are also carriers of sarcosporidiosis and toxoplasmosis, the latter of which particularly affects marsupials.

Cats are present in most Australian habitats and are wholly or partly responsible for many of Australia's mammal extinctions. They are listed as a key threatening process for Australian ecosystems. Controlling feral cats and foxes is most effective when undertaken as part

of a landscape or regional-scale program. Both regularly re-invade areas after control has finished, so the more properties involved in eradication programs, the more effective the programs will be. Timing and frequency are important. Baiting at least twice a year, but preferably quarterly, is recommended.



By the 1930s, foxes had become established across southern Australia. They are now considered a priority threat to the survival of many small to medium-sized native mammals.

THE SOLUTIONS...

- » Burying baits along tracks frequented by foxes is more effective than shooting, trapping or den fumigation. It is best done during early winter, when foxes are mating, and in late summer/early autumn when young disperse. Check and replace baits often. Most councils provide resources to help with baiting.
- » Always desex and contain pets. Most local governments lend residents cat traps to remove feral or stray cats.

Nationwide, foxes are a threat to at least 48 threatened mammal species, 14 birds, 12 reptiles and 2 amphibians.


Foxes occur at high densities in patchy landscapes of mixed bush and farmland where food and shelter are abundant. In some areas, foxes kill up to 30% of newborn lambs, attack poultry, damage fruit crops, spread weed seeds, and chew watering systems. Their greatest impact, however, is environmental. Foxes have been implicated in the extinction of six mammals in south-eastern Australia, and many threatened species persist only in areas where foxes are absent or exist at low densities.

Landscape of fear

Foxes don't just control rock-wallaby colonies through predation. The mere presence of a fox creates a 'landscape of fear', restricting rock-wallabies to areas near rocky refuges, leading to overgrazing of vegetation, starvation, and population crashes. It also prevents rock-wallabies from recolonising nearby suitable habitat. The landscape of fear may persist long after foxes have been controlled, creating a conundrum for wildlife conservation managers.

Below: Foxes are efficient predators of joey rock-wallabies, suppressing populations. Landscape-scale fox control resulted in several native mammals being removed from threatened species lists in Western Australia. Studies showed that where foxes were controlled, rock-wallaby populations grew by over 600% in a few years. Nearby rock-wallaby colonies without fox control declined.





Habitat connectivity can be re-established when areas that link colonies and provide shelter for dispersing rock-wallabies are protected or revegetated.

THE PROBLEM

Clearing forest and woodland for agricultural, residential and tourist developments removes suitable brush-tailed rock-wallaby habitat. Out-of-control weeds and competition with introduced herbivores negatively impact brush-tailed rock-wallaby colonies.

YOU CAN HELP BY MANAGING HABITAT

Rocky outcrops not only support brush-tailed rock-wallaby colonies in their own right but are also critical stepping stones (or maybe bounding points) for fostering rock-wallaby movement between colonies. In some cases, rocky habitat or 'shelter rocks' could be artificially established to enable better linkage between isolated rock-wallaby colonies.

Clearing forest and woodland, overgrowth of weeds and increasing populations of feral herbivores all reduce suitable brush-tailed rock-wallaby habitat.

Land clearing has been the most significant contributor to the decline of Australian mammals since European settlement. Extensive clearing for agricultural, residential and tourist development has isolated brush-tailed rock-

wallaby colonies, reducing their opportunities for movement and inhibiting genetic flow between populations. Altered landscapes leave brush-tailed rock-wallabies more susceptible to predation and can prevent recolonisation even when foxes are controlled.



Lantana camara and *Lantana montevidensis* (pictured) are Category 3 invasive plants that form impenetrable thickets and outcompete native flora. *Lantana* infestation negatively impacts some 1400 native Australian species.

Weed removal

Weed invasion reduces habitat suitability for brush-tailed rock-wallabies by replacing grassy foraging areas with unpalatable flora and increasing bushfire risk. Woody weeds can be removed manually or by herbicide application. Grassy weeds generally require treatment with herbicides or regeneration of habitat through revegetative planting to make conditions unfavourable for invasive species. Freely available resources, such as at weeds.org.au, can assist with weed identification and control methods.

Connecting rocky outcrops

At the broader landscape scale, connectivity can prevent predators from picking off young wallabies as they attempt to move into open space between colonies; thus, restoring connectivity is critical to brush-tailed rock-wallaby survival and population recovery.

THE SOLUTIONS...

- » Re-establishing habitat connectivity through revegetation links colonies and provides shelter for dispersing rock-wallabies.
- » Shooting is an effective control method for goats, but must be undertaken by licensed shooters.
- » Australia's Biosecurity Act obliges landholders to prevent the spread of *lantana* and other weeds. Integrating manual removal with controlled burns and herbicides works best.

Below: Controlling introduced herbivores that compete with brush-tailed rock-wallabies for food and shelter can help populations recover. Fencing around brush-tailed rock-wallaby colonies reduces competition for native grasses, particularly in areas where livestock graze close to rock-wallaby populations.



A brush-tailed rock-wallaby is standing on a dark, mossy rock. The wallaby has greyish-brown fur with a white patch on its chest and orange-brown fur on its arms and legs. It is looking directly at the camera. The background is a blurred natural setting with green foliage and a light-colored rock.

THE PROBLEM

The loss of Indigenous burning regimes, combined with the impacts of climate change, have increased the frequency and intensity of severe bushfires.

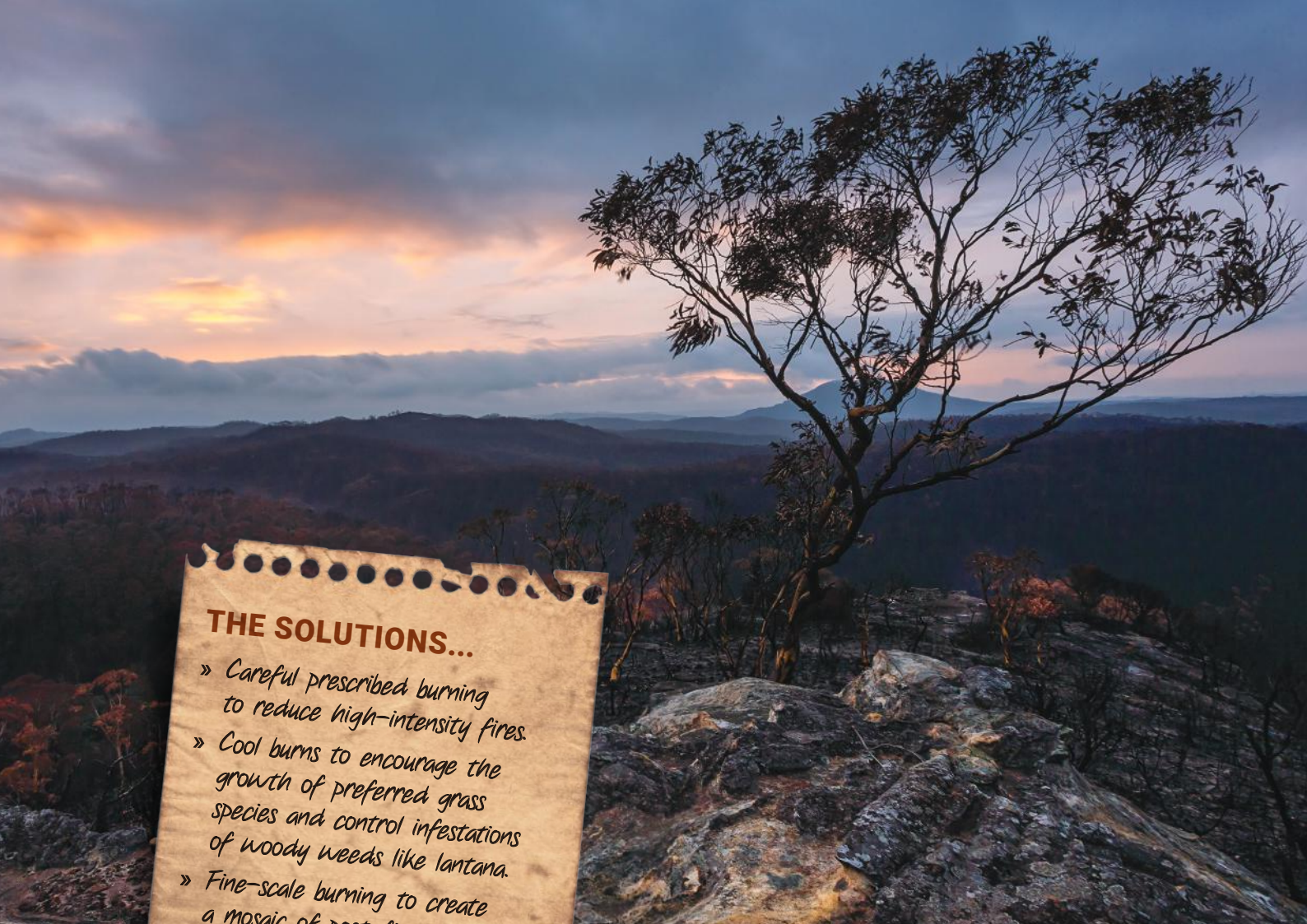
YOU CAN HELP BY REDUCING FIRE RISK

All macropods are at risk during bushfires. Brush-tailed rock-wallabies may have an advantage over other macropods during widespread blazes, as they seek refuge in caves or crevices; however, following intense fires they may be unable to access water, and the loss of forage around their rocky refuges presents a starvation risk.

While the impenetrable habitat rock-wallabies prefer serves as some protection from conflagrations, post-fire starvation has led to the loss of rock-wallaby colonies.

The horrific bushfires of 2019–2020 overlapped half of the known range of the brush-tailed rock-wallaby, and the impacts on rock-wallaby populations are still being assessed. Because of the fragmentation of rock-wallaby habitat, colonies abandoned

after fire can take years to re-establish, if they do at all. Careful prescribed burning is needed to reduce the risk of high-intensity fires and to create a patchwork of resilient food and shelter resources that will protect native flora and fauna.



THE SOLUTIONS...

- » Careful prescribed burning to reduce high-intensity fires.
- » Cool burns to encourage the growth of preferred grass species and control infestations of woody weeds like lantana.
- » Fine-scale burning to create a mosaic of post-fire vegetation that provides suitable forage with high-nutrient values, as well as retaining dense ground cover that shelters wallabies from foxes and cats.

Intense bushfires denude landscapes, placing surviving rock-wallabies at higher risk of being eaten by cats and foxes or by natural predators such as dingoes and wedge-tailed eagles. Researchers determined that as many as 70 native species lost 30% of their habitat in the 2019–2020 bushfires and may require a reassessment of their conservation status as a result.





YOU CAN HELP BY REPORTING SIGHTINGS

To help save the brush-tailed rock-wallaby, researchers need a better idea of where populations exist and in what numbers.

Reporting sightings to the Brush-tailed Rock-wallaby Conservation Network helps Wildlife Queensland's project officers follow up with non-invasive monitoring.



Drones are an emerging tool for potential detections, and helicopter surveys can also help discover populations aerially in inaccessible areas.

The threats listed in this guide are bad enough on their own, but they compound to create real danger for brush-tailed rock-wallabies. Individuals may survive bushfires only to be picked off by foxes and cats, which take advantage of the lack of cover following blazes.

Habitat clearing makes rock-wallabies unable to recolonise habitat even when predators and other threats have been controlled. These threats to rock-wallaby survival have shrunk most populations to a small number of individuals in fragile populations that are at risk of extinction from bushfires, droughts and disease outbreaks. Small populations are prone to inbreeding depression and genetic drift, which leave populations unable to respond to environmental change and

increase extinction risk. Habitat clearing and introduced predators prevent movement between colonies and recolonisation of suitable habitat after extinction events. Luckily, conservation actions can be taken to improve the trajectory of brush-tailed rock-wallaby populations and reduce the risk of extinction to colonies and the species as a whole.

Monitoring

Monitoring is the critical first step in managing brush-tailed rock-wallaby recovery. Australia's history of threatened species monitoring is generally poor. Fewer than 10% of our threatened fauna species are monitored on a regular basis. Without monitoring, we don't know whether populations are increasing,

decreasing, or stable. Monitoring also helps assess whether pest control is working. Monitoring colonies that are not receiving management is crucial to determining how rock-wallabies are faring. Landholders setting up wildlife cameras near foraging areas or colonies is a simple, cost-effective method. Other common survey methods include scat counts (pellet plots) and helicopter surveys.



Project Officer Paul Revie sets an infrared wildlife monitoring camera. Brush-tailed rock-wallabies have unique coat patterns, so individuals can be identified from images and population estimates obtained.



How you can help

Wildlife Queensland established the Brush-tailed Rock-wallaby Conservation Network (BTRWCN) to survey for undiscovered rock-wallaby colonies, monitor populations, undertake conservation actions, and bring together groups and individuals interested in brush-tailed rock-wallaby conservation in the state. Established with funding from the Australian Government, the BTRWCN will be a hub for the preservation of this species. Find out more at bit.ly/btrw-network

Volunteer

The BTRWCN is undertaking conservation actions across South East Queensland. Whether you're a landholder with brush-tailed rock-wallaby habitat, experienced at setting camera traps, an expert weed controller, or you just want to know more, scan the QR code (above right) and sign up to our volunteer database to receive notifications about how you can help.

Adopt a Brushie

Join our 'Adopt a Brushie' program to support the ongoing survival of vulnerable brush-tailed rock-wallabies and the regeneration of their habitat. For a donation of \$60 or more, you can symbolically 'Adopt a Brushie' for one year. Each adoption pack includes:

- » adoption certificate
- » colour information sheet
- » a BTRWCN fridge magnet
- » rock-wallaby tote bag.



*Adopt a
brushie today!*





Australian Government



Wildlife Queensland aims to advocate, protect and conserve Queensland's native terrestrial and marine animals and landscapes by educating and engaging communities, influencing decision-making, advancing solutions and connecting people and wildlife. www.wildlife.org.au

This publication is supported through funding from the Australian Government.