





Enduring quenda persistence on the Swan Coastal Plain



It is not uncommon to spot a quenda digging in the leaf litter in bushland throughout the Swan Coastal Plain, or scurrying around the suburbs of Perth. Their presence is reassuring when you consider that they are persisting despite living with the challenges brought by urban development and introduced predators. In fact, one population in Ellen Brook Nature Reserve is doing so well it is being used to bolster quenda numbers at several other locations throughout the State.

by Cheryl Lohr
and Leonie Valentine

The quenda (*Isoodon obesulus fusciventer*), or southern brown bandicoot, is a medium-sized (400 to 1,800-gram) marsupial that is native to south-west Western Australia. The species has brown fur; a long, narrow face; a short tail; and moves around on all four limbs. Quenda are mostly nocturnal, but they can also be crepuscular (active at dawn and dusk), and during the cooler months they can be seen in the late afternoons. Like other species of bandicoots, quenda are omnivorous and dig distinctively shaped foraging pits while searching for underground invertebrates, tubers and fungi. They have also been observed digging for vertebrate eggs and may also consume small vertebrates. Some of their diggings are small, little more than ‘nose-pokes’ in the litter, while others can be well-excavated holes, nearly big enough for them to sit in. Quenda diggings are quite different to those created by the introduced European rabbit (*Oryctolagus cuniculus*), and tend to be more discrete and lack the piles of faecal pellets often associated with rabbit foraging.

FACING THREATS

Many of Australia’s medium-sized mammals, including the quenda, are impacted by a range of threats, including introduced predators – primarily cats (*Felis catus*) and red foxes (*Vulpes vulpes*), impact of fire and habitat loss. Quenda are considered a Priority 4 species, which means it is rare, near threatened and in need of monitoring. On the south-eastern coast of Australia, their closely related subspecies (*Isoodon obesulus obesulus*) is listed as endangered. In WA, the *Western Shield* wildlife recovery program has effectively used baiting to reduce fox numbers resulting in the recovery of quenda populations. In 1998, they were removed from the threatened species list. Today, they continue to persist in remnant habitat throughout the Swan Coastal Plain, including many reserves in the Perth metropolitan area.

Quenda are affected by inappropriate fire regimes. They prefer dense, low



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Main Quenda are considered medium-sized marsupials, usually weighing between 400 and 1,800 grams.

Photo – Simon Cherriman

Inset Craigie Bushland is one area that quenda have been translocated to.

Photo – Leonie Valentine

Above Predator-proof fences at Ellen Brook Nature Reserve help to protect native animals from cats and foxes.

Photo – Gerald Kuchling/DBCA

Right Quenda digging up an artificial turtle nest.

Photo – Helena Bowler



shrubland to forage underneath, and low grass trees with leaves that touch the ground provide refuges from predators and the elements.

Like so many other native animals, quenda have also been impacted by land clearing for urban development and agriculture. However, in recent years, housing developers have been engaging environmental consultants to trap and move quenda out of bushland before they clear it for housing. They then work in consultation with the Parks and Wildlife Service to translocate the quenda to appropriate habitat.

TURNING THE TABLES

Ellen Brook Nature Reserve and Twin Swamps Nature Reserve, in Perth’s north-east, are home to the critically endangered western swamp tortoise (*Pseudemysdura*

umbrina) – Australia’s rarest and most threatened reptile. Western swamp tortoises are targeted by red foxes so sections of the two nature reserves were fenced to offer them protection.

The fences have also afforded protection to quenda to such an extent that they have reached very high densities in these areas. And, despite the fences being fitted with a gate system that enables quenda to leave the reserve, this has had implications for the western swamp tortoises – especially those in the last self-sustaining wild western swamp tortoise population, located in Ellen Brook Nature Reserve. This is because quenda have enhanced olfactory senses, and are known to dig up western swamp tortoise nests and to consume the eggs. A camera-trap study carried out by Helena Bowler from The University of



Western Australia (UWA) even recorded quenda efficiently locating and extracting artificial tortoise nests.

To help minimise their predation on the turtles, Parks and Wildlife Service staff travel to Ellen Brook and Twin Swamps nature reserves twice a year to trap quenda and translocate them to other bushland reserves in the Perth region. Long-term data indicate this program improves juvenile recruitment of western swamp tortoises and the monitoring of the quenda populations indicates a sustainable number of quenda are being harvested from the reserves.

WIN-WIN

Removing quenda from the reserves minimises the predation pressure upon the critically endangered western swamp tortoise, but it also provides an



Far left A quenda.
Photo – David Bettini

Left Red foxes pose a grave threat to many native species, including quenda.
Photo – Jiri Lochman

Below left Gates in the predator-proof fences enable native animals to freely travel in and out of the reserves.
Photo – Gerald Kuchling/DBCA

Below During the past 10 years, quenda have been translocated to 15 locations.
Photo – Graham Zemunik/Sallyanne Cousans Photography



opportunity to reintroduce or replenish quenda populations to fragments of natural habitat that still remain on the Swan Coastal Plain and further afield. During the past 10 years, quenda have been translocated to Thomsons Lake Nature Reserve, Shark Bay, Julimar State Forest, Wadderin Sanctuary Narembeen, Yellagonga Regional Park, Yalgorup National Park, Craigie Bushland, Dianella Regional Open Space, Maralla Road Nature Reserve, Star Swamp Nature Reserve, Melaleuca Park (proposed nature reserve), Woodvale Nature Reserve, Cottonwood Crescent Reserve and Dundas Nature Reserve.

To be a suitable translocation site for quenda, the bushland needs to have more than 60 per cent vegetation cover under one metre of understorey, be protected from foxes, be at least 10 hectares in

size, have remained unburnt for the past 10 years, and preferably have a wetland, or creek nearby. Unfortunately, there are few sites on the Swan Coastal Plain that meet all these criteria. But the presence of dense, connected understorey vegetation that will offer shelter to quenda from predation is the key factor for suitability.



Learn more about the quenda



Scan this QR code or visit Parks and Wildlife's 'LANDSCOPE' playlist on YouTube.

Digging up the dirt on Australia's diggers

Australia has many digging mammals, from tiny marsupial moles that weigh as little as 50 grams, up to 30-kilogram wombats, although most of the diggers belong to the bandicoot, bilby, bettong and potoroo groups, within the 400 to 2,000 gram weight range. Several of these digging mammal species are threatened by a combination of introduced predators, fire and habitat loss; and many have suffered range declines and reductions in population size. For example, the woylie (*Bettongia penicillata*) was once widespread throughout much of southern Australia, with anecdotal accounts from early settlers indicating they were once very abundant. Now the woylie is critically endangered and occupies less than one per cent of its former range. This bettong species creates numerous foraging pits while searching for underground fungi, its primary food source. Ecologist Dr Mark Garkaklis estimated that an individual woylie that weighs about 1.3 kilograms could turn over 4.8 tonnes of soil per year.

The ecosystem services of digging mammals

When animals ingest soil or dig to create foraging pits, burrows, tunnels and mounds, they are manipulating the top layer of earth. Known as bioturbation, the movement of soils by animals, from earthworms to badgers, may be very important for long-term environmental processes and ecosystem health as it breaks the soil-surface layer, often mixing soil types and changing soil hydrophobicity (the water repellence of the soil) and water infiltration. Flow-on effects of digging can include nutrient recycling through the mixing of organic matter, altered microbial activity, changes to mycorrhizal fungal associations, the capture and retention of seeds and enhanced plant germination and recruitment.

The quenda and the echidna (*Tachyglossus aculeatus*), are the more commonly occurring digging mammals left in south-west WA. Research by scientists at Murdoch University and UWA has shown that an individual quenda can turn over nearly four tonnes of soil per year while digging for food. In addition, their foraging pits have lower soil-water repellency and higher soil moisture levels. The foraging pits may also increase native seedling recruitment. Current research on the translocated population of quenda at Craigie Bushland is examining whether quenda reduce the amount of litter on the substrate (by burying the litter with soil evacuated from their foraging pits) as well as the role of quenda in enhancing litter decomposition and nutrient cycling.

Where to see digging mammals around Perth

If you'd like to see digging mammals in the Perth region, try bushwalking in some of the larger urban reserves where quenda have been translocated, such as Craigie Bushland or Thomsons Lake Nature Reserve. Quenda are also known to forage around Murdoch University and Beelihar Regional Park. During the cooler months you can sometimes see quenda in late afternoon; and at Lesmurdie Falls they've been spotted foraging around picnic tables. Although you may not see the quenda themselves, hopefully you'll find some of their foraging pits. Further afield from Perth, you have a good chance of seeing echidna, and their foraging tracks. Barna Mia Nocturnal Wildlife Sanctuary, nestled within Dryandra Woodland is an excellent place to take a night time tour and see digging mammals such as woylie and bilbies up close.



Top Quenda diggings vary in size from small nose pokes to holes deep enough for them to sit in.
Photo – Simon Cherriman

Above Echidnas create diggings and provide an important service maintaining healthy soil.
Photo – Sallyanne Cousins

Below Quenda can be spotted in many suburban backyards.
Photo – Simon Cherriman



“... Perth and Mandurah residents with dense vegetation in their gardens, and pets that are kept inside at night, might find quenda in their gardens and they will continue to persist in our bushland areas for generations to come.”

PROMISING SIGNS

The quenda population translocated to Craigie Bushland is doing particularly well. In 2013, 46 quenda were translocated to this City of Joondalup reserve from Ellen Brook and Twin Swamps nature reserves. Subsequent ongoing quarterly monitoring has recaptured almost half of these original source animals and identified about 80 new animals, indicating very successful recruitment to this population. Craigie Bushland is a predator-proof fenced reserve that excludes foxes, cats and dogs, but has pedestrian gates to ensure the public can still access this beautiful bushland.

Inside the fence, Dr Leonie Valentine from UWA is monitoring how quenda might be changing the soil, the decomposition of leaf-litter, and other aspects of the micro-habitat (see ‘Digging up the dirt on Australian diggers’ on page 26).

Meanwhile, in the nearby Woodvale Nature Reserve, Dr Cheryl Lohr is monitoring a new population of quenda using remote-sensing cameras. Sixteen quenda were released into the dense bushland in the north-east corner of the reserve in August 2016, followed by 22 more in May 2017. Although the Woodvale reserve is fenced, it is not predator-proof and foxes have been observed there. Domestic cats may also threaten the reintroduced quenda population, with at least three collared cats, one with recent signs of veterinary treatment, being recorded on camera in the past six months. The quenda population at this site is being closely monitored.

PROVING THEIR STRENGTH

Quenda can survive in the metropolitan area, despite the threat of cats and foxes, as long as there is adequate vegetation for shelter, and they have been spotted outside Craigie Bushland and Woodvale Nature Reserve. In addition, recent diggings spotted by a Parks and Wildlife



Service scientist suggest they have moved into fragments of bushland around the Ocean Reef Road freeway off-ramps, bike paths, and at Edgewater train station. We assume the young quenda are squeezing out through the fences put in place to protect them and suspect the quenda living in bushland around Craigie came from the fenced bushland population. Quenda are known to have escaped from several fenced reserves in the south-west of WA, and a similar species, the golden bandicoot (*Isodon auratus*) is known to have escaped from a fenced enclosure at Matuwa in the northern Goldfields.

In early 2017 two male quenda were killed on the roads – one on the freeway near Craigie Bushland, and a second one on Ocean Reef Road between Woodvale and Edgewater. Both these animals were probably dispersing from existing populations into new territory. Scientists from UWA, with support from Main Roads, is researching the impact of roads on our native wildlife.

Quenda will use short underpasses to disperse and move under roads, particularly if there is vegetation for shelter. Scientists from Murdoch University have carried out research that indicates that quenda rely on sheltering in urban gardens and need to be close



to nature reserves. With a bit of luck, Perth and Mandurah residents with dense vegetation in their gardens, and pets that are kept inside at night, might find quenda in their gardens and they will continue to persist in our bushland areas for generations to come.

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Above left A domestic cat recorded by a remote-sensor camera at Woodvale Nature Reserve.
 Photo – DBCA

Above Parks and Wildlife Service’s Alice Revealey getting ready to release a quenda into Craigie Bushland.
 Photo – Leonie Valentine

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Also contributing...

Alice Revealey is Parks and Wildlife Service’s Swan Coastal District fauna conservation officer.

Gerald Kuchling is a DBCA senior research scientist and a tortoise and freshwater turtle specialist.