



Karakamia
Wildlife Sanctuary
has been offering
refuge for Western
Australia's native
mammals since
1991.





Bringing back the animals

by Jacqui Richards, Trish Garaner and Martin Copley

Karakamia Wildlife Sanctuary, located in the Perth hills near Chidlow, is one of the Australian Wildlife Conservancy's (AWC's) properties that works to fulfill the not-for-profit organisation's biodiversity conservation mission. It was purchased by Martin Copley in 1991 (see 'Karakamia Sanctuary', *LANDSCOPE*, Summer 1997-98) and was the birthplace and inspiration for AWC's network of 20 sanctuaries now covering more than 2.5 million hectares of Australia. AWC has been able to protect habitat and provide land management to help conserve more than 65 per cent of Australian terrestrial mammal species and 72 per cent of terrestrial bird species, not to mention the reptiles, frogs and untalied invertebrate communities.

The 280-hectare Karakamia Wildlife Sanctuary is situated in the northern jarrah forest in the Darling Range and is surrounded by a vermin-proof fence that excludes foxes and feral cats. The property was purchased to restore some of the former Darling Range fauna that was once widespread and abundant in the region, but had declined or disappeared altogether due primarily to predation by introduced predators.



Reintroductions

Karakamia is home to a suite of threatened mammal species, which were translocated by AWC and the Department of Environment and Conservation (DEC). A complete lack of medium-sized mammals was addressed with the reintroduction of woylies (*Bettongia penicillata*), quenda or southern brown bandicoots (*Isodon obesulus*) and numbats (*Myrmecobius fasciatus*) in 1994, western ringtail possums (*Pseudochirus occidentalis*) in 1995, mainland quokkas (*Setonix brachyurus*) in 1996 and tammar wallabies (*Macropus eugenii*) in 1998. Brushtail possums (*Trichosurus vulpecula*) and brush wallabies (*Macropus irma*) were present when the sanctuary was fenced. However, both populations were supplemented with additional animals to bolster the small number of founder animals originally enclosed within the fence.

Since constructing the fence and removing introduced predators, Karakamia has proven itself as a bountiful source population for many threatened mammals. More than 670 animals have been translocated from Karakamia to other reintroduction sites around Australia. The sanctuary offers a safe haven for these threatened mammals that have declined elsewhere on the mainland, where foxes and feral cats remain abundant. Fenced populations also provide a secure breeding nucleus with which to repopulate the landscape if, or when, a global solution to combat the threatening processes causing mammal decline and extinctions has been found.

Woylie wonderland

This reintroduction success has been obvious with some species. While the woylie may be experiencing population declines in the south-west of Western Australia, there are no signs of such a decline behind the predator-proof fence at Karakamia. AWC staff estimate there are at least 500 woylies in the 280-hectare sanctuary, a density of two woylies per hectare. This is probably similar to the peak in numbers found in the wild in the 1990s after the instigation of DEC's *Western Shield* fox-baiting program.

Nearly 800 woylies have been born and individually marked at Karakamia, initially with ear tags and, in more recent times, with passive implant transponders (PIT tags), small microchips inserted under the skin at the back of their neck. The high density of woylies combined with recent drier rainfall years led AWC to translocate



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Main Woylie.

Insets top left Numbat.

Photos - Jiri Lochman

Top right Quenda.

Centre left Tammar wallaby.

Photos - Sallyanne Cousans

Bottom right Brushtail possum.

Photo - Ann Storrie

Left Predator-proof fencing protects the sanctuary.

Photo - Sallyanne Cousans



Above Visitor centre at Karakamia.
Photo – Andy Ballard

Above right Woylies.
Photo – Ann Storrie

Right Brushtail possum.
Photo – Jiri Lochman



animals to alternative sites in an effort to reduce both intra-specific (within species) and inter-specific (between species) competition for food sources.

Just five years after their initial release at Karakamia in December 1994, AWC began moving woylies to its Paruna Wildlife Sanctuary, 30 kilometres away in the Avon Valley. More than 300 woylies were moved in five separate translocations between 2000 and 2006. More recently, woylies have been moved to AWC's Scotia Wildlife Sanctuary in New South Wales, into an 8,000-hectare feral-free area enclosed by a fence. Woylies disappeared from New South Wales before the 1920s, and had been declared extinct in that state.

Many woylies were also translocated to conservation estates in the south-west of WA, including Avon Valley and Kalbarri national parks and Tutanning, North Kalgarrin, Cervantes and Julimar nature reserves, and to a private sanctuary, Genaren, in New South Wales. Woylies have persisted at many of these reintroduction sites, however, the populations have never mirrored the rapid increase seen within Karakamia.

There is little doubt that foxes and feral cats have prevented repopulation of the forested areas of southern WA where it once roamed.

Possums to Lorna Glen

The brushtail possum is another species for which Karakamia has proven a boom town. Any visitor driving through the entrance to the sanctuary in the evening will have to dodge the brushtail possums as they scurry across the tracks. With the absence of foxes and cats it has been very obvious that the brushtail possums spend more time on the ground than they do in the tree tops, making them even more visible than usual.

In 2008, 35 brushtail possums were translocated from Karakamia to Lorna Glen, a pastoral lease managed by DEC about 1,100 kilometres north-east of Perth, to top up the population of animals originally released in 2007. By all accounts the possums have settled in well to their new home, using the hollows in the river red gum woodlands that fringe the creeks and wetlands and provide excellent shelter during the day. Several have even taken up residence at the homestead and are regular visitors to the kitchen and outside dining table. There may be an opportunity to send more animals to the rangelands to further reduce the possum population within Karakamia.



Above Jarrah forest typifies much of the Karakamia Wildlife Sanctuary.
Photo – Richard Woldendorp/AWC



Left A wedge-tailed eagle chick in nest.
Photo – Jiri Lochman

Restoring ecosystem function

One of the original aims in establishing Karakamia Wildlife Sanctuary was not only to recreate the past mammal fauna assemblages of the Darling Scarp, but also to restore function to an ailing ecosystem where natural processes had been disturbed for many years. While obviously not possible to mimic the bushland of 200 or 300 years ago, due to the irreversible environmental changes wrought by European settlement, the vision of reversing some of these changes started with the eradication

of introduced species, followed by mammal reintroductions. The hope was that bringing back just a small part of the former ecosystem would ignite a series of processes and linkages to act in a catalytic manner, in turn bringing other processes that had either been disturbed or removed back to the environment.

One of the most remarkable effects has been associated with bringing woylies back to the jarrah forests. The ground litter layer in surrounding long-unburnt areas, such as John Forrest National Park, is often deeper

than within Karakamia. Woylies have effectively incorporated much of the leaf litter layer into the soil profile through their daily digging in search of subterranean fungi, which forms a large component of their preferred diet. Their staggering ability to turn over five tonnes of soil a year per woylie improves water penetration and soil nutrient levels—a vital component in improving the typically nutrient-poor lateritic soils of the Darling Range. In turn, this results in lower leaf litter accumulation rates offering a lower fuel load, and thereby decreasing the bushfire risk within the sanctuary. This reduction in fuel load has modified AWC's prescribed burning program, providing an opportunity to conduct fewer, smaller burns to create a fine-scale mosaic of structural diversity and density within the vegetation.

Another interesting outcome has been the replacement of introduced predators by native predators such as the wedge-tailed eagle. A pair of wedge-tailed eagles has nested in or adjacent to Karakamia for many years, constructing grandiose stick nests in

Right Western pygmy possum.
Photo – Jiri Lochman

tall jarrah trees and typically rearing one or two chicks a year. At the end of each breeding season, an assortment of prey remains collect at the base of the nest, providing an insight into the diet of the birds. In WA, wedge-tailed eagles' diets are usually made up of 90 per cent rabbits, with the odd reptile or bird and other mammals such as kangaroos and wallabies.

Not surprisingly, the major component of the diet of the pair at Karakamia was brushtail possums and woylies (57 per cent), Australian ravens and wood ducks, with the odd bobtail skink (*Tiliqua rugosa*) or Gould's monitor (*Varanus gouldii*). There were only a handful of introduced species found among the prey remains. The birds of prey preferred to hunt threatened mammals from within the sanctuary rather than rabbits from surrounding agricultural land and forested reserves, and take birds from open areas in the paddock and near the dam in the southern section of Karakamia. Perhaps a new equilibrium has been attained at Karakamia where the abundant mammal populations can now sustain a level of natural predation.

Other benefits

With the removal of introduced predators, four additional mammal species have made an appearance at Karakamia. The occasional chuditch or western quoll (*Dasyurus geoffroii*) appears in the sanctuary. There is some concern that they will eat the reintroduced threatened mammals. However, like the wedge-tailed eagle, they are simply reclaiming their right as a top predator within the ecosystem.

Another mammal to pop up is the mardo or yellow-footed antechinus (*Antechinus flavipes*). There are not many that can claim to have watched a mardo sunning itself from their office window or heard the pitter patter of paws as they cheekily scamper across the rafters. Western pygmy possums (*Cercartetus concinnus*) and dunnarts (*Sminthopsis griseoventer*) have also appeared in annual trapping surveys. All these animals are



likely to have occurred in the Darling Range before the establishment of Karakamia, but the combination of introduced predator control within Karakamia and DEC's *Western Shield* program has undoubtedly provided the opportunity for their numbers to increase.

Birdlife within Karakamia is prolific with more than 100 species recorded, including the beautiful red-tailed black-cockatoo, screeching their distinctive call "karak, karak...", from which the sanctuary derives its name. A large number of water birds are recorded in and around the dams and surrounding riparian habitat, which offer a diversity of vegetation to accommodate a far greater variety of fauna than the surrounding agricultural areas, remnant vegetation and water reserves.

Managing mammal populations

The reality of surrounding an ecosystem with a fence has created some interesting management

problems—some predicted, some quite unexpected. The high number of woylies at Karakamia makes it difficult to trap other species, such as quenda, possums or tammar wallabies. Even with intensive trapping programs, nearly all traps are filled with woylies within an hour of dusk. Competition for the universal bait of peanut paste and rolled oats sometimes results in two woylies successfully maneuvering their way into the trap before the door shuts.

One of the key issues at Karakamia, and other fenced areas, is to determine the carrying capacity of target species and manage those populations and their impact on the broader ecosystem and other species. AWC is addressing these issues through ecological monitoring to measure the success of management techniques and by translocating animals to other sites that are free from introduced predators.

For example, the tammar wallaby population has increased significantly

during the past two years, becoming the most frequently seen wallaby in the paddocks at night. In response, AWC is translocating tamar wallabies to its Paruna Wildlife Sanctuary, where a fledgling population has already become well established, providing further insurance for this rare and beautiful wallaby.

Habitat restoration

Considerable effort has been expended on restoring degraded sections of Karakamia with many hours of volunteer assistance. Thickets of golden wreath wattle (*Acacia saligna*), one-sided bottlebrush (*Calothamnus quadrifidus*) and marri (*Corymbia calophylla*) have been planted in paddock areas and are now used by the throngs of tamar wallabies that clump together at the edge of the paddock areas. Where trees have been felled to maintain firebreaks, the logs are moved into the undergrowth to add habitat for invertebrates, reptiles, small mammals and birds. Weed management is an ongoing issue as staff and volunteers target noxious weeds such as cape tulip, arum lillies, lupins and tagasaste from paddock and riparian areas to ensure these species do not infest the bushland.

The area around the dam was successfully rehabilitated using a combination of direct seeding and planting of a range of local reeds and sedges. The resultant vegetation is now

so thick that it is almost impenetrable and nine species of frog can now be heard croaking and quacking from the dam and associated creek line. The reintroduced quokkas also favour the habitat, with a pair occasionally sighted on spotlight walks.

Some areas of paddock have been retained within Karakamia as they are preferred foraging grounds for species such as tamar wallabies, brush wallabies and western grey kangaroos. The paddock areas also provide a remarkable viewing point for visitors to the sanctuary. Cryptic animals such as quenda become readily visible by spotlight in the open grassland and even ringtail possums that usually camouflage themselves among the thick foliage can be seen using the large habitat trees that remain in the paddocks.

On the tourist trail

Karakamia presents a rare opportunity for Perth residents and visitors to witness the diversity once present within our jarrah forests. It is one of the few places that people can come to see a suite of threatened mammals in their natural habitat. AWC conducts evening interpretive walks and spotlight tours at Karakamia, fulfilling a role in educating the public about the plight of Australia's threatened mammals, what is being done to reverse the decline of some species, and how AWC has assisted in the process. The regular walks through the sanctuary provide a wealth of opportunistic information to accompany routine monitoring via annual trapping and quarterly spotlighting.

The future

As things stand, the long-term outlook for Australia's medium-sized mammals, along with many other



Above left Signs reminding visitors to take care on sanctuary roads.

Left Revegetation around the dam.
Photos – Sallyanne Cousans



Above Boardwalk over Cookes Brook at Karakamia.

Right Looking for possums during an evening guided walk.

Photos – Sallyanne Cousins



animals, is grim. But in the southern half of Australia, where the fox and cat have wreaked such havoc, Karakamia does provide a glimmer of hope. It shows that, freed from fox and cat predation, successful populations of threatened native mammals can be re-established. AWC manages additional feral-free sanctuaries within Australia, including Faure Island where feral cats have been eradicated (see 'Return to Faure Island', *LANDSCOPE*, Autumn 2007). AWC's overall reintroduction strategy is designed to ensure these places are managed in an integrated manner while continuing to expand a network of feral-free sanctuaries. Meanwhile, the search for a long-term solution for controlling fox and cat predation must continue relentlessly so that AWC and others can help build a future where fences are no longer required.

Jacqui Richards was a wildlife ecologist with Australian Wildlife Conservancy (AWC), and now works as a consultant. She is involved in the conservation of threatened mammals and the control of introduced predators in Western Australia and can be contacted on (08) 9438 1239 or by email (jacqueline.richards@bigpond.com).

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