Gilbert's potoroo
eight years on

With only 20 to 40 individuals known in the wild, Gilbert's potoroo is the rarest mammal in Australia. What is being done to save these marsupials from extinction?

by Tony Friend

There was great excitement in the zoological world in December 1994, with the announcement that an 'extinct' species had been rediscovered (see 'Lost & Found', *LANDSCOPE*, Autumn 1995). Elizabeth Sinclair had been trying to catch quokkas for her doctoral study of their genetics. She and volunteer Adrian Wayne found some unidentified, bandicoot-sized mammals in the large cage traps they had set in Two Peoples Bay Nature Reserve, near Albany. Elizabeth and Adrian took two of the animals back to the Two Peoples Bay Research Station and alerted Alan Danks, the nature reserve manager. The animals were identified as Gilbert's potoroos (*Potorous gilbertii*). The species was discovered in 1840 and recorded from the Albany area up until 1879. It then vanished from the scientific record.

Potoroos and bettongs belong to the rat-kangaroo family (the Potoroidae). Family members share a liking for underground fungi, or truffles, and a tendency to become endangered or extinct. Four different potoroo species are recognised. The broad-faced potoroo is thought to be extinct, Gilbert's potoroo was thought to be extinct until its rediscovery, and the long-footed potoroo is endangered and only known from a small area of Victoria. Only the long-nosed potoroo from Tasmania and Victoria is reasonably common and secure. A similar situation exists among the bettongs.

Gilbert's potoroo looks very similar to the long-nosed potoroo and, in 1970, a book on Australian mammals decreed that they were one and the same. According to the author, the early records of potoroos around Albany represented merely a western population of the long-nosed potoroo. This decision had been made from studying dried skins and skulls, without the benefit of modern DNA techniques. After the excitement of making the discovery of a lifetime, Elizabeth continued her study of quokkas, but incorporated an investigation of the potoroos. Working with another geneticist, Mike Westerman, she showed that Gilbert's potoroo was indeed a distinct species, as genetically different from the long-nosed potoroo as was the much larger long-footed potoroo.

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Its slightly protruding eyes scanning for danger overhead, a Gilbert's potoroo pauses from its search for underground fungi.
Photo – Jiri Lochman

Left: The first live Gilbert's potoroo examined by scientists in 115 years sits quietly in the hands of Two Peoples Bay reserve manager Alan Danks, December 1994.
Photo – Tony Friend

Below: A female Gilbert's potoroo with her young in the captive colony at Two Peoples Bay.
Photo – Jiri Lochman

SEARCHING FOR POTOROOS

As soon as potoroos were discovered on the slopes of Mount Gardner, in Two Peoples Bay Nature Reserve, researchers began looking for other populations. Very little of the large tracts of uncleared rugged land along the south coast had been searched thoroughly. If Gilbert's potoroos had remained undetected at Two Peoples Bay, where years of detailed biological fieldwork had been carried out, it was quite possible that other populations might exist in less well-known areas. Mount Gardner is a special area, having escaped extensive fire for many years. Natural firebreaks have been created by the lakes and sand patches on the isthmus and the large areas of granite on the slopes of the mountainous headland. The long-unburnt vegetation on the slopes and in the gullies provided a haven for the noisy scrub-bird, rediscovered there in 1962, and other threatened birds such as the western bristlebird and western whipbird. Since the 1960s, fire had been deliberately excluded by careful management, mainly to preserve the noisy scrub-bird.

Searches since 1994 for other potoroo colonies concentrated on areas nearby, particularly on and around Mount Manypeaks, an imposing peak across Two Peoples Bay from Mount Gardner. Although much of the mountain was burnt in 1978, moist gullies on the southern side escaped the fire and are now inhabited by noisy scrub-birds—reintroduced to the area from Two Peoples Bay in 1983.

Surveying for potoroos requires special techniques. Although they make many small diggings to obtain underground fungi, these are difficult to distinguish from those of quendas (bandicoots) that also occupy the coastal heathlands. Setting cage traps to find potoroos is very labour intensive, and covers very small areas at a time, as every trap needs to be checked early each morning to ensure the welfare of the animals. However, potoroos can be detected in other ways, due to their habit of moving along recognisable runways through the dense scrub, and their fondness for peanut butter and pistachio essence.

Top: Since the discovery of Gilbert's potoroos at Two Peoples Bay, nearby Mount Manypeaks has been the site of intensive searches for additional populations.
Photo – Tony Friend

Above: Over the years, large granite outcrops have helped to reduce the spread of wildfires on the slopes of Mount Gardner, allowing the development of the long-unburnt heathlands favoured by Gilbert's potoroos.
Photo – Jiri Lochman

UNDERNEATH THE ARCHES

Small arches of flexible plastic sheeting are held in shape by bent fencing wire, and double-sided sticky-tape inside the arches takes small samples of hair from the backs of animals moving through them (quokka and potoroo hairs are very similar to the naked eye, but can be readily distinguished under the microscope). Scattering bait underneath the arches increases the chance of movement through them. Hence, if numerous arches are set up within runways in likely potoroo habitat—for one to three weeks at a time—they are very likely to pick up evidence of any colony that exists there.

Left: Tony Friend (centre) and Jackie Courtenay (right) measure a Gilbert's potoroo in the wild, assisted by Cathy Jenkison (left) and Vinh Nguyen.
Photo – David Broadhurst

Below: Mount Manypeaks, from Two Peoples Bay Nature Reserve.
Photo – Marie Lochman

A possible potoroo hair was collected from a different type of hair-tube near the top of Mount Manypeaks in 1996 by Department of Conservation and Land Management researcher Sarah Barrett. A subsequent survey by Jackie Courtenay, Sarah Vetten and Kelly Gillen using hair arches detected another suspect hair in the same place. A trapping survey, involving 100 cage traps, six people and a helicopter, was carried out in November 1998. Much effort carrying and setting traps in dense bush down each side of the mountain turned up possums, quendas and many bush rats—but no potoroos! However, vast areas of Mount Manypeaks remained unsurveyed. The question of whether or not a small potoroo colony was still hidden in the scrub around Mount Manypeaks and the adjacent Waychinicup National Park had to be answered. Such a find would provide the opportunity to combine gene pools in captive breeding or translocations, and hence give this little marsupial a more secure future than is provided by the limited genetic resource of the Two Peoples Bay population.

NOT TURNING A HAIR

Many more short surveys with hair arches and cage traps were carried out over the following three years, without result. In 2002, the Department of Conservation and Land Management funded a four-month search of coastal bushland between Cheyne Beach and Gull Rock, just east of Albany. Jennifer Trouchet undertook this survey, carrying plastic hair arches for kilometres through rugged terrain and dense scrub in search of suitable animal runways. The arches were checked and rebaited each week for three weeks, then collected and taken to the laboratory for analysis. Hundreds of hair arches were set and collected, then painstakingly inspected for hairs.

Although Jennifer found potoroo hairs only within Two Peoples Bay Nature Reserve, she showed that quokkas were widespread through the Mount Manypeaks/Waychinicup area, from Cheyne Beach to Two Peoples Bay.

While the lack of new potoroo colonies was disappointing, the presence of quokkas was still good news. The discoverer of Gilbert's potoroo, John Gilbert, called it 'the constant companion' of the quokka, and, indeed, the two species coexist on Mount Gardner. It is likely that many of the runways used by Gilbert's potoroo there are 'dual-use pathways', maintained by the larger quokka. If quokkas are common on Mount Manypeaks, this area may be suitable for the reintroduction of Gilbert's potoroo. Further evaluation of the habitat near Mount Manypeaks and in other areas, particularly regarding the supply of truffles, is required before any sites can be selected. Surveys are continuing in other areas, thanks to a grant from the Threatened Species Network to the Denmark Environment Centre, which is undertaking hair-arch surveys for Gilbert's potoroo, between Albany and Augusta, with the Albany-based Gilbert's Potoroo Action Group.

OTHER RESEARCH

At Two Peoples Bay, research to learn more about potoroos, so that we can assist their survival, has continued. Most importantly, how many potoroos are there? It was clear from the beginning that such a small area could not support large numbers, but the dense bush and rugged terrain have made the discovery of the different colonies on Mount Gardner a drawn-out process. Although Two Peoples Bay Nature Reserve encompasses more than 4000 hectares, potoroos only occur on the Mount Gardner headland, in less than a quarter of the reserve. Furthermore, potoroos are only found in areas with a particular kind of tall kwongan (heathland) dominated by *Melaleuca striata*. Regular trapping in all of the places where potoroos are known to occur results in the capture of only 15 to 20 different individuals. Given that we are trapping in well over half of the known suitable habitat, an upper estimate of 40 animals seems somewhat optimistic.

The tiny size of the only known population of Gilbert's potoroo makes it the rarest mammal in Australia. The only other species that comes close is the northern hairy-nosed wombat, which is found only at one site, but has more than 80 individuals. Both species are clearly very close to extinction, and extremely vulnerable to localised catastrophes. In the case of Gilbert's potoroo, the most threatening event would be an extensive wildfire. While Two Peoples Bay Nature Reserve is carefully managed to exclude fire, the establishment of another population of Gilbert's potoroo is urgently needed.

Young Gilbert's potoroos remain in the same area as their mother until they are about three-quarters grown, when they leave to establish their own home range. Photo – Jiri Lochman

Regular trapping provides important information on the breeding success of the Gilbert's potoroo population. Females can have a joey in the pouch at any time of the year, but most new animals are caught in winter. These young ones are born in late summer and early autumn and are being weaned just as the serious rains start and truffle numbers increase. It is likely that many of the young born at other times of year don't survive. This may be because they are lost from the pouch or as young-at-heel (young that have left the pouch, but are still suckling or in the early stages of independence). It is unlikely that there is enough room for all of the young that are produced (most young-at-heel are not captured later as young adults). Radio-tracking studies are now under way to see whether they are leaving the mountain in search of new habitat, or starving to death from lack of unoccupied truffling grounds in which to settle down.

Either way, it is clear that more young are produced than can survive on Mount Gardner. Most animal populations produce excess young, as an insurance policy for the individuals trying to pass on their particular genes. It allows natural selection to occur: the fitter survive and the species becomes better

Although it is superficially similar to the long-nosed potoroo from eastern Australia, DNA studies have shown that Gilbert's potoroo is a distinct species.
Photo – Jiri Lochman

adapted to its environment. However, for a species as close to extinction as Gilbert's potoroo, it is something of a luxury!

CROSS-FOSTERING

Although a captive colony was established soon after the rediscovery of Gilbert's potoroo, breeding has become infrequent. Most of the original six animals and three pouch young have died of old age or various ailments. If the colony is to continue, it needs to be rejuvenated. Rather than taking more adults from the wild—where they have an important place in the small population—the excess pouch young may be able to be saved and added to the global total of Gilbert's potoroos.

Since the 1960s, researchers have known that macropod pouch young over a certain age can be taken off the teat and replaced, or swapped from one female to another, if the two young are of similar size. David Taggart of the University of Adelaide has been using this technique—called cross-fostering—in a desperate bid to save the Victorian brush-tailed rock-wallaby from extinction. In a program run by the Victorian Rock-wallaby Recovery Team, tammar wallabies act as surrogate mothers. Pouch young of the endangered rock-wallabies are taken from their wild mothers and placed in the pouches of tammars. Macropod females can hold an embryo in reserve at a very early stage of development, in case their pouch young is lost. During cross-fostering, this young begins to develop as soon as the pouch young is removed. Theoretically, a female of an endangered species could have several young being raised by different surrogate mothers, hence considerably increasing her rate of reproduction. Happily, no species recognition problems have arisen and cross-fostered brush-tailed rock-wallabies have subsequently mated and produced young with their own kind!

In collaboration with the Western Australian Department of Conservation and Land Management and Cleland Wildlife Park in South Australia, David has studied woylies, boodies and long-nosed potoroos to determine which would be the most suitable surrogate species for cross-fostering Gilbert's potoroo. The long-nosed potoroos came out in front, as they were more docile than the others and, of course, very good mothers! Approval has now been given to undertake a limited trial, transferring a few Gilbert's potoroo pouch young from the wild into long-nosed potoroo pouches. If the trial is successful, cross-fostering may have a place in the toolbox of techniques available for saving the species. This is a very exciting prospect.

At the same time, a team led by Terry Fletcher in the research section at Perth Zoo will be developing techniques to artificially inseminate long-nosed potoroos. Artificial insemination in marsupials is only in its infancy, because, for many marsupials, semen cannot be stored or transported easily. These techniques will be working well in long-nosed potoroos before they are applied to Gilbert's potoroos. Artificial insemination is a valuable technique, because it can overcome behavioural compatibility, as the animals have no choice about their breeding partner. This is particularly important in captive breeding colonies, where compatible pairs of animals can quickly become over-represented by continually producing young.

FUTURE PROSPECTS

Gilbert's potoroo has survived at Two Peoples Bay for many years without anyone knowing about them. Is the level of intervention being proposed really necessary? It is likely that without the policy of fire exclusion that has been in place over the last 40 years, Mount Gardner would have burnt. Even with current management, a small source of ignition in the wrong place, under the wrong conditions, could easily cause a fire that would kill a large proportion, if not all, of the potoroos on Mount Gardner. A lightning strike in December 2000 started a fire that burnt within two kilometres of the potoroo population. Without at least one more population, the prospect of Gilbert's potoroo lasting another 50 years doesn't look very rosy. But it is encouraging that the support of the community for the recovery program is growing. Let's hope we're not too late.

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Once thought to be extinct, Gilbert's potoroo has overcome many obstacles. What is being done to improve its chances of survival? See page 28.

Cane toads are poisonous, prolific breeders and are getting closer to the WA border. Hop to page 10.

Discover some of the prehistoric megafauna that once roamed the State in 'Walking with WA giants' on page 23.

The tuart once typified the coastal strip north and south of Perth. Why should we cherish this majestic tree? See page 16.

Lichens decorate Lake Muir, near Manjimup, with varying colours and shapes. Turn to page 43 to learn more about these fascinating life forms.

FEATURES

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COVER

Royal hakea rises above the surrounding heath, straight and column-like. When sunlit from above or below, its unusual large variegated leaves appear to glow like lanterns, so the shrub is also known as the Chinese lantern bush. Among the birds that obtain nectar from its flowers (hidden at the base of the leaves) is the western spinebill.

Royal hakea grows almost exclusively in Fitzgerald River National Park, an area that was reserved on the recommendation of then Government Botanist Charles Gardner (see 'Botanic Guardian' on page 36).

Cover illustration by Philippa Nikulinsky

DEPARTMENT OF Conservation AND LAND MANAGEMENT
Conserving the nature of WA