Missing mammals:

a 100-year-old mystery

Just over 100 years ago, in 1904, a young Englishman, Guy Shortridge, arrived in Perth charged with collecting a representative sample of Western Australia's mammals and birds for the British Museum of Natural History. He spent three years travelling around the southern half of WA collecting in a wide range of habitats. However, much of his collecting, particularly in arid and semi-arid regions, was frustrated by the scarcity or absence of mammals. Long-time residents reported that the scarcity of mammals resulted from their sudden and complete decline some 20 years earlier. Why these mammals had disappeared remains a mystery.

by Jeff Short

Guy Shortridge was just 24 years old when he arrived in Western Australia. Despite his comparative youth, he had served with the South African Constabulary in the Boer War and done some collecting in Pondoland (on the east coast of southern Africa) for the British Museum of Natural History. His trip to WA was funded by a wealthy British philanthropist, WE Balston, who owned farms in the Albany and Tambellup areas. Shortridge arrived in Perth in November 1904 by the ship *Omrah* from London and, for three years, travelled extensively around the State by coastal steamer, train, and, in the Gascoyne, by bullock wagon. He travelled from local towns or farms to collecting localities by horse and trap (a two-wheeled buggy) or by horse and pack horse with an Aboriginal guide.

Often he did it tough, spending weeks camping and travelling with "natives", living on possums and kangaroo rats, flour, tea and sugar and "getting about on their horses and carts, what it turns out they have patched together from bits of discarded drays". His travels were not without incidents. His stipend of £200 a year was never enough for him to travel freely around the country and he often felt under pressure from London for not collecting sufficient specimens of mammals. He was laid up for a week with sunstroke in Southern Cross, stung by a scorpion, and was often troubled by bull ants entering his camps. Preserving his specimens in the bush without spoilage and the physical task of transporting them back to Perth or Albany for transhipment to London was often challenging.

His travels took him to five broad regions in WA: the south coast (Albany and surrounds), the woodlands and shrublands of what is now the western Wheatbelt (Wagin, Arthur River, Beverley, Brookton and Pingelly and surrounds), the forest of the south-west (Busselton and Margaret River), the semi-arid woodlands of the Goldfields (Southern Cross, Kalgoorlie and Laverton), and to coastal and inland areas of the Gascoyne. His extensive and timely collections make him one of the key figures in Western Australian natural history. He is commemorated in the scientific naming of the heath rat (*Pseudemys shortridgei*). In June 1907, he left Perth for Java to continue his collections for the museum in a very different environment.

Western Australia at Federation

The WA Shortridge arrived in was very different from that we know today. It was just 75 years after the first settlement at Albany and Perth and just three years after Federation. WA had languished for much of the previous century but had just been through a major resources boom based on the discovery of gold in the interior. This had led to a big surge in population though the 1890s to

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Main A water pool on top of Boyagin Rock in Brookton.
Inset Honey possum feeding on a swordfish banksia flower.
Photos – Marie Lochman

Above A tug pulls the SS *Omrah* at Fremantle.
Photo – Courtesy State Library of Western Australia Battye Library.

Left Early map showing Shortridge's travels.
Image – Courtesy of Natural History Museum, London

Above A granite kunzea on top of Boyagin Rock in Boyagin Nature Reserve—a parcel of land that has escaped agricultural clearing.
Photo – Jiri Lochman

180,000 at the turn of the century, and this was accompanied by infrastructure development such as the new railway and water pipeline to Kalgoorlie. The increased population provided a market for agricultural products and the improved infrastructure provided greater access to formerly remote parts of the colony. These factors were about to contribute to the next wave of development—agricultural expansion into what we now know as the Wheatbelt. However, in 1904, the limited agricultural development was closely associated with the Perth to Albany and the Midland to Geraldton (Walkaway) railways.

Shortridge's collection

Shortridge relied extensively on Aboriginal people, local farmers, and trappers to assist him with collections. He used a firearm and some 200 break-back traps (described as wooden spring or gin traps) of various sizes suitable for trapping mouse-sized animals to dingoes. At some sites he made use of dogs. In Wagin he used terriers to assist in catching bandicoots, wallabies, and possums, and at Laverton he used kangaroo dogs to catch red kangaroos. Some species were not readily trapped or sighted and he had to rely on the serendipitous capture by locals. For example, a specimen of honey possum was collected from the bottom of a well and sent to him. Shortridge collected specimens of echidna, 25 species of marsupial, 10 species of bat, eight species of rodent, as well as rabbits and dingoes. In all, he was able to collect 46 species.

Key findings

Shortridge's collections of mammals and his reports on their status are particularly important because they indicate the approximate timing and the spatial pattern of decline of mammals in WA. His collections and observations pre-date many of the factors commonly cited as important in mammal decline today. In particular, the European red fox had not yet arrived in WA. Rabbits were barely pushing into the eastern half of WA at the time and the government of the day was intent on keeping them out of the south-west by constructing the rabbit-proof fence. Extensive grazing was the agricultural mainstay of the colony at this time but its impact was likely to have been localised. In 1906 there were only three million sheep, just 8.7 per cent of the maximum of 39 million recorded in 1990 in WA. Many of these were in the extensive pastoral country of the north-west. Similarly, cropping was in its infancy with only about 176,000 hectares cleared for cropping compared with the maximum of 6.8 million hectares attained in 1985.

Shortridge found that the most extensive areas of decline were in the semi-arid zone and appeared independent of land use. Declines were comparable in the Gascoyne region where pastoralism was well established and in the Goldfields region where mining was the predominant activity and pastoralism and agriculture were almost entirely absent. In addition, declines were common to both marsupials and native rodents. Only the large kangaroos, dingoes, echidna and dalgyte (bilby) were present.

Above left Wandoo forest.
Photo – Marie Lochman

Top A red fox.
Photo – Jeff Short

Above House mouse.
Photo – Jiri Lochman

One region where Shortridge found an apparently intact fauna was in the woodlands and shrublands of what is now the western Wheatbelt (areas to the immediate east of the towns of Pingelly and Brookton). Shortridge was able to obtain some 20 terrestrial native species in this region in comparison to just three to five species in the semi-arid interior.

Shortridge speculated that disease, predation by feral cats, competition from house mice, bushfires, and the myriad impacts of closer settlement were likely to be the cause of the loss of mammals.

While scientists have been reluctant to blame disease for mammal decline in recent decades, DEC Senior Principal Research Scientist Ian Abbott has recently resurrected the idea of disease as a culprit, following a detailed search for historical sources. Disease is cited by many prominent figures in natural history from the period 1880–1930, including Tom Carter (naturalist), John Tunney (collector), and Bernard Woodward and Ludwig Glauert (Western Australia Museum curators and directors), as a cause of mammal decline. However, none of these early commentators had direct experience of the decline, which apparently occurred before the mid-1880s. The common thread to their musings is bewilderment at the suddenness and completeness of the decline. Tom Carter—apparently the first to suggest disease as an explanation for the decline of mammals at Shark Bay in his diaries from the late 1880s— draws heavily on a similar dramatic decline in numbers of the Aboriginal population from measles at about the same time. This explanation is repeated almost verbatim many times in the historical record, including by Shortridge, and this commonality suggests that all derive from a single source.

Predation by feral cats is an explanation that has received recent support from scientists, largely due to the dire impacts observed on populations of reintrodûced mammals in arid and semi-arid Australia and new evidence regarding the timing of their introduction to, and colonisation of, WA. Predation by feral cats in combination with severe drought may have caused the total demise of populations of many species in semi-arid and arid areas and to have caused substantial decline followed by resurgence in the south-west where small remnant populations may have persisted in habitat refuges. Shortridge's most direct experience of cat predation was on Bernier Island. Here, he believed, some five cats introduced to the island were responsible for the near-absence of western barred bandicoots.

Shortridge was often surprised by the lack of small native rodents and marsupial mice at places that he trapped and, in contrast, the considerable abundance of introduced house mice even at great distances from settlement. His inference was that house mice may have displaced the native mice by direct competition with native species. Other possible ways for house mice to contribute to mammal decline include through acting as a vector for disease or as a superabundant food source to fuel the numbers of feral cats or other predators.

Shortridge believed that fires set by settlers would impact on native mammals through the direct death of animals as well as destruction of their shelter. He observed the death of

Above left Brushtail possum.
Photo – Rob Olver

Above Vermin-proof fence.
Photo – Marie Lochman

Left Releasing a western barred bandicoot.
Photo – Jiri Lochman

possums killed by fire and noted that many native mammals were dependent on tree hollows and these were lost with frequent or intense fire. However, it is unclear how widespread the use of fire was at this time. Shortridge only reported bushfires in late autumn in the western Wheatbelt and at a site where mammals were most abundant. Here it was used to facilitate clearing of the land by new settlers. Hence, it seems unlikely it could be responsible for the widespread prior loss of mammals.

Shortridge mentioned the impact of closer settlement, particularly around York and Beverley, on the likelihood of obtaining native fauna. He also mentioned the prevalence of hunters and the use of poison to kill dingoes around Wagin. However, he was able to travel east of these centres towards the rabbit-proof fence to find rich pickings of mammals.

There then, gone now

In stark contrast to Shortridge's result from the early 1900s, the western Wheatbelt region is now identified as having one of the highest rates of loss of mammals of anywhere in Australia. The mammals of this region fell victim to a second wave of decline, likely due to the arrival of the European fox from the east in the 1920s. In addition, extensive clearing for agriculture starting in the early 1900s and continuing through to the 1970s and 1980s has transformed this landscape into one where much native fauna finds it difficult to persist. The few remaining extensive areas of remnant vegetation appear to have been left largely because their dense understoreys of poison plants precluded clearing. Such areas include Tutanning, Boyagin and Dongolocking nature reserves and Dryandra Woodland.

In Shortridge's time, dingoes were still very common at Margaret River and Busselton and were present at Wagin (where Shortridge lost his dogs to baits set for dingoes), and at Brookton and Pingelly. He also reported them around Carnarvon.

Still significant uncertainty

The mysterious loss of mammals in semi-arid WA in the 1880s remains a subject of significant uncertainty to this day. During the past 20 years there has been increasing recognition and acknowledgement of the historical role of introduced foxes in stripping the Western Australian landscape of much of its formerly rich mammal fauna. The Department of Environment and Conservation's *Western Shield* program and community initiatives such as the reintroduction of mammals to Heirisson Prong at Shark Bay have built on our new capacity to control foxes. This has enabled us to re-establish some of our lost fauna to key conservation areas. However, while foxes are undoubtedly important, the historical perspective afforded by Shortridge's collections and descriptions suggest that any explanation for the decline and extinction of our mammals since European settlement must involve more than this single cause.

The causes of decline suggested by Shortridge all remain possible contenders, either alone or in combination. All are worthy of further research as factors threatening our remaining wildlife. Recent historical research has generated a rich source of largely anecdotal information which nevertheless has greatly informed this 100-year-old conundrum.

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