

Historical ecology

– diagnosing mammal decline

Loss of mammals

Australian mammals have fared badly over the past 200 years with 17 species extinct, 10 species surviving only on islands, and another 17 species reduced to remnant populations in less than 10% of their range at the time of European settlement.

There is considerable uncertainty over the primary drivers of extinction. Numerous changes in land use and invasion by exotic species happened in quick succession in the historical record and the timing of loss of mammals is uncertain due to paucity of museum collections and historic records.

Loss of species is often attributed to a mix of habitat modification resulting from changes in



fire regimes with the displacement of Aboriginal people, the widespread modification of habitats by introduced domestic grazers such as sheep and cattle, the ravages of the rabbit, extensive land clearing, and the impact of exotic predators such as foxes and feral cats. The role of exotic predators is particularly controversial with many conservation scientists reluctant to accept a major role for such predators. Evidence from historical sources may help resolve such controversy.

View from the Nullabor c. 1880-1930

An oral history account of long-time Nullabor resident Amy Crocker suggested two waves of losses of species from the Nullabor. Some species (possums, burrowing bettongs) were lost prior to 1900 before the arrival of foxes. This loss was attributed to “a strange virus” in the 1880s or 1890s. Other species (bilbies, brush-tailed bettong, bush stone curlew, malleefowl and bustards) survived to the early 1920s but declined thereafter. Their loss was linked to the arrival of the fox in 1917.

View from the western slopes of NSW (1883-1920)

Ecologists trying to establish the timing and cause of loss of species of native mammal have relied on museum collections. However,

often species were represented by sparse collections that made inference problematic. For example, three species of bettong (or rat kangaroo) are represented by < 4 museum specimens for the period prior to 1900. In contrast, bounties were paid on over 3 million rat-kangaroos as “pest” species in the period 1883-1920 (see example of schedule of payments, over the page). These bounty payments provide

important documentation of the distribution and abundance of these species in the late 19th and early 20th century in NSW and allow inference on the timing and likely cause of their demise.

The western slopes of NSW were subject to massive changes over the last decades of the nineteenth century. Aboriginal land management was disrupted and replaced, sheep numbers built to over 55 million, peaking in 1892, rabbits covered the landscape like a grey blanket, spreading from south to north in the period from 1870, and the land was subject to recurring drought. The impact on the native

vegetation of these changes were profound. Surprisingly, bettongs (rat kangaroos) persisted on the western slopes of NSW through much of this period. The south-north pattern of their decline in the period 1905-1915 closely matched the pattern of colonisation of the State by foxes.

Now, three of five species of rat-kangaroo in NSW are extinct, one species persists in < 2% of the State (the far NE), and the fifth species persist in dense coastal thickets. Both surviving species persist in habitat not readily hunted over by foxes or where foxes are scarce or absent.

Early loss of mammals in Western Australia – “marasmus” or cats?

Guy Shortridge, a collector for the British Museum of Natural History spent three years (1904-1907) collecting specimens in southern Western Australia, less than 80 years after European settlement. He provides the only modern record of the presence of many species. He found strong contrasts between abundant and species-rich sites in the south-west (mesic woodland sites east of Pingelly and Beverley; and mesic coastal sites near Albany and Margaret River) and species-poor sites of the semi-arid Gascoyne and Goldfields.

He attributed loss of fauna to a “marasmus” in the 1880s, but also viewed feral cats (abundant at that time), the spread of house mice, and fire as major contributors. He viewed closer settlement as an important influence in localised areas.

Australian overview (1919-1922)

Charles Hoy, a collector for the US Museum of Natural History, spent three years in Australia collecting at more than a dozen locations. His letters and field notes provide valuable insights into the status of the Australian fauna and the perceived threats to its persistence at that time.

His circumnavigation of Australia during this period provided him with a national overview that no one else of the time possessed.

He recorded few threats to the tropical fauna, but many in temperate areas (foxes, cats, poisoning and trapping techniques to control rabbits, land clearing and hunting in localised areas, and regular burning of the forests). He singled out the arid fauna as particularly at risk. He identified two periods of decline, the first affecting the larger native rodents, and the second the species the size of small wallabies. His observations suggested a synchrony in decline at two distant locations – Tamworth in NSW and Eyre Peninsula in South Australia –

[Schedule 14.] PASTURES AND STOCK PROTECTION ACT. SCALE OF BONUSES FOR SCALPS.		
NOTICE is hereby given that the Board of Directors for the District of Tamworth, acting under the abovenamed Act, has fixed the scale of prices which the Board is prepared to pay as bonuses for the scalps of the following noxious animals, namely:—		
		s. d.
For the scalp of every scrub wallaby or padamelon		0 2
Do rock wallaby		0 2
Do hare		0 ½
Do kangaroo rat		0 2
Do native dog or pup over 3 months old		10 0
Do eagle-hawk		0 6
Do crow		0 ½
By order of the Board, W. D. DOWE, Secretary.		
Dated at Tamworth, this 24th day of April, 1895.		
N.B.—Dog scalps must have their tails attached by a strip being taken down the back.		
3458		Es.

that coincided with the arrival of the eruptive wave of the fox invasion.

Relevance to present-day management

Historical records provide new data enabling us to re-evaluate long-held views on the cause or causes of decline of Australian mammals. In particular, they suggest a greater role for exotic predators in mammal decline. Greater current emphasis on management of exotic predators has produced considerable benefits for the conservation of mammal populations, particularly in Western Australia.

Support

Projects were funded by Shark Bay Salt Joint Venture, Ian Potter Foundation, National Geographic, and CSIRO.

Key references

Richards, J.D. and Short, J. (1996). History of the disappearance of native fauna from the Nullarbor Plain through the eyes of long-time resident Amy Crocker. *Western Australian Naturalist* **21**, 89-96.

Short, J. (1998). The extinction of rat-kangaroos (Marsupialia: Potoroidae) in New South Wales, Australia. *Biological Conservation* **86**, 365-377.

Short, J. and Calaby, J.H. (2001). The status of Australian mammals in 1922 - collections and field notes of museum collector Charles Hoy. *Australian Zoologist* **31**, 533-562.

Short, J., (2004). Mammal decline in southern Western Australia - perspectives from Shortridge's collections of mammals in 1904-07. *Australian Zoologist* **32**, 605-62.