

The Bramble Cay melomys: the first mammalian extinction due to human-induced climate change

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The Bramble Cay melomys (*Melomys rubicola*) was confirmed to be extinct in 2016, having disappeared somewhere between late 2009 and December 2011. It is the first mammal to be reported extinct due to oceanic inundation associated with human-induced climate change (Gynther *et al.* 2016). As an Australian, this abhorrent fact is cringeworthy in itself. But, when combined with the fact that it is the 30th terrestrial mammal confirmed extinct in Australia since 1788 (Woinarski *et al.* 2015) ... well I need an adjective well beyond abhorrence to describe my feelings.

Ironically, this previously poorly-known mammal will become a celebrity much like the dodo (*Raphus cucullatus*). Of the dozen American men who walked on the moon Neil Armstrong and Buzz Aldrin are the only two easily remembered. Like them the Bramble Cay melomys will stick in our minds as the first terrestrial mammal to become extinct through human-induced climate change. What we will be less likely to be able to recite will be the following 11 such extinctions.

Its extinction conjoined with climate change raises certain questions, for example, does climate change only impact on the world in the future, or does it impact now? Surely this is a rhetorical question given the Bramble Cay melomys is extinct now. Focusing only on the impacts of futuristic climate change allows politicians and their advisors to promise plans for the future, which cost little and require no action in the present. Perhaps identifying climate change impact now might force their hand. We must keep reminding them of the impacts now and cite the Bramble Cay melomys. It is not threatened in the future, it is extinct now.

But what was the Bramble Cay melomys and what of its history?

Melomys is a large genus of rodents in the family Muridae, which is the ubiquitous family of rats and mice known from their worldwide distribution. This famous family also contains the well known black rat (*Rattus rattus*) and house mouse (*Mus musculus*) (Jackson and Groves 2015). The genus *Melomys* refers to a natural group of mostly small rats found in north-eastern Australia, Papua New Guinea and Melanesia. Members of the genus have a pattern of scales on their tail that do not overlap but meet in a mosaic pattern. In 1924, Oldfield Thomas

formally described and named *Melomys rubicola* (the Bramble Cay melomys). He described it as ‘A comparatively large species, with a very long tail.’ On one specimen, the tail at 171 mm was longer than the head and body combined at 140 mm. Its general colour above was a ‘dark buffy brown’ with the nape and middle area of the posterior back being more ‘strongly ochraceous’ (of the colour of ochre); its under surface a dull white and its feet whitish. Most obvious to Thomas was its long tail, which he suggested was curled at the tip and ‘perhaps more prehensile than usual’ (Thomas 1924). The first Europeans to collect the species were John Macgillivray and Joseph Beete Jukes, in May 1845, during the voyage of the HMS *Fly* (Thomas 1924). During that expedition, Lieutenant Yule, commander of the surveying schooner HMS *Bramble*, encountered Bramble Cay with its endemic rodents. The Bramble Cay melomys were apparently abundant and the seamen aboard the *Bramble* made recreation of it by shooting it with bows and arrows (Sweatman unpublished; Gynther *et al.* 2016).

In 1875 the *Chevert* Captained by Charles Edwards on an expedition headed by William Macleay called at Bramble Cay and collected four *M. rubicola* (Fulton 2016). Alas, these were not reported in the scientific literature along with other mammals collected (e.g. Ramsay 1877). William Macleay did not record collecting this species in his private journal, although he recorded the *Chevert* stopping there and collecting generally on August 13, 1875. The Captain, who was not one of the collectors, supplied a brief narrative of the voyage to a Sydney newspaper later that year. He wrote, ‘Here [Bramble Cay] we got great numbers of birds and amongst other things, large centipedes, and a rat peculiar to the island’ (Edwards 1875; Fulton 2016).

Since its second collection in 1875, it seems to have been largely ignored. Its population was estimated at several hundred individuals in December 1978 (Limpus *et al.* 1983). A formal census in 1998 captured 42 individuals and estimated a population of 93 (Dennis and Storch 1998). In 2002 and 2004 censuses using the same methodology as 1998 found only 10 and 12 individuals (Latch 2008). A brief survey in 2011 found none, but this survey was hampered by nesting turtles. Another incomplete survey was undertaken in March 2014, which again failed to detect the species (Gynther *et al.* 2014). Six months later brought a more thorough and exhaustive search, but by the time

Ian Gynther and team arrived with permission to capture individuals for captive breeding and to count the population—the species was gone (Gynther *et al.* 2016).

What is Bramble Cay and why was it so sensitive to oceanic inundation?

Bramble Cay is a tiny vegetated cay of ~5 ha surrounded by a coral reef and located in extreme north-east of the Torres Strait, ~50 km from the mouth of Papua New Guinea's Fly River (Fulton 2016). The area of this tiny cay that is exposed above the high tide was reduced by the erosion of wind, waves and tides to 2.5 ha by 1998 (Dennis and Storch 1998). Oceanic inundation onto Bramble Cay is drastically increased by storm activity, particularly cyclones. By 2014, the vegetated area providing habitat had declined to 0.065 ha due to salt water inundation (Gynther *et al.* 2016).

Why did the Bramble Cay melomys become extinct?

Clearly, the diminishing and extremely small habitat linked with oceanic inundation resulted in the demise of the species—its end somewhat analogous to a shipwreck. This much can be surmised from the available information. But, this is the ecological explanation for its extinction. Surely we must be cognisant of the other proximal causes of its ultimate mortality. What is the explanation for the lack of an effective conservation initiative? Why did the positive human intervention come too late? I suggest intervention was impeded by the perception that this was a rat, thus unlike the giant panda (*Ailuropoda melanoleuca*) or koala (*Phascolarctos cinereus*) it engendered few empathetic feelings. It was not cute and cuddly. Its remote location cost too much in monetary terms to visit. Its extinction identifies that the economic model of survival of the cheapest is already the model in use. Flagship species like the giant panda and koala are exempt from this model and from the economic rationalist position, because their extinction would draw too much negative press. Herein lies the irony: the Bramble Cay melomys was allowed to become extinct, because it was not a flagship species, yet as the first known mammalian extinction to human induced climate change it has become a flagship species—it has been promoted to the headlines. We have not heard the last of this little known mammal. For the future I wonder when will we tire of hearing about the next animals (or plants) that become extinct due to climate change? How quickly will their names be forgotten like those of Pete Conrad and Alan Bean, the third and fourth men to walk on the moon?

Whither the future?

John Woinarski wrote, 'Neglect and inaction caused this extinction... Such disregard must not be allowed to drive more extinctions' (Woinarski 2016). The present is informed by the past. Thus, we must learn from our mistakes. In the case of the Bramble Cay melomys, inaction on its research and conservation were paramount in its demise. Woinarski *et al.* (2016) stated they found no record of any activity devoted to its conservation. In particular, they highlighted that the lack of captive breeding was nonsensical and that no record of any funding for its conservation was found despite applications. Their critical review

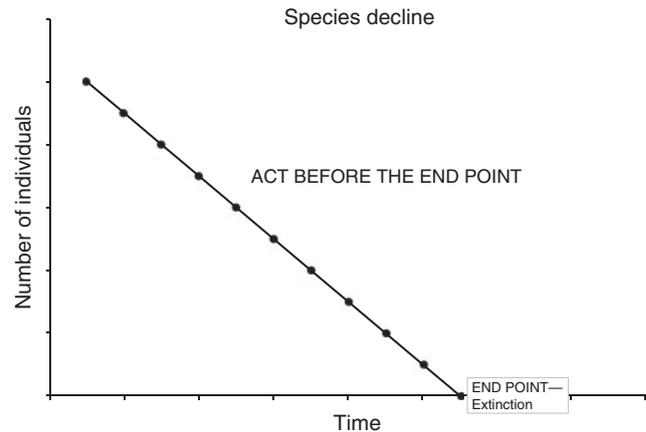


Fig. 1. Extinctions are preceded by declines. The idea is to act to stop the decline before reaching the end point.

went on to point to a bottleneck of one or two people who 'may have contributed to the failure to prevent the extinction'. I concur with them when they say the fate of species must not rely so capriciously on the foibles of individuals. Perhaps more surprising to me was that peer-reviewed articles, focused on the ecology of the Bramble Cay melomys during the period of its decline, were absent. It concerns me that research, which ought to be widely available, is hidden away in various unpublished reports. There seems to be much work to do if further extinctions are to be prevented. Woinarski *et al.* (2016) make 15 widely applicable recommendations to prevent extinctions. However, John Woinarski presented an image at the Ecological Society of Australia recently that points simplistically to what must be done. When a species is in decline the end point will, sooner or later, be extinction. Act when the decline is noticed, because no practical action is possible after the end point (Fig. 1).

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