

From the Scientific Urban Legend Department: “The little Bramble Cay melomys is likely the first mammal claimed by man-made climate change”

Guest essay by Kip Hansen

The Claim:

Bramble Cay melomys (mosaic-tailed rat) is the first mammal to go extinct due to human-induced climate change.

Rating:



A NUGGET OF TRUTH SURROUNDED BY SPECULATION

Examples:

“A small rodent that lived only on a single island off Australia is likely the world's first mammal to be a casualty of climate change...” [National Geographic](#)

“Bramble Cay melomys, a rodent round in body, long in whisker and lumpy in tail. The creatures are probably the first mammal casualty of man-made, or anthropogenic, climate change,...” [The Washington Post](#)

“University of Queensland and Queensland Government researchers have confirmed that the Bramble Cay melomys – the only mammal species endemic to the Great Barrier Reef - is the first mammal to go extinct due to human-induced climate change.” [The University of Queensland News](#)

...and [over 80,000 more](#).

“The key factor responsible for the extirpation of this population was almost certainly ocean inundation of the low-lying cay, very likely on multiple occasions, during the last decade, causing dramatic habitat loss and perhaps also direct mortality of individuals. Available information about sea-level rise and the increased frequency and intensity of weather events producing extreme high water levels and damaging storm surges in the Torres Strait region over this period point to human-induced climate change being the root cause of the loss of the Bramble Cay melomys.” [Confirmation of the extinction...](#)

The Bottom Line:

There are no longer any Bramble Cay melomys living on Bramble Cay. Their extirpation was almost certainly caused by environmental degradation resulting from the very nature of Bramble Cay as a “geologically temporary..[island]..of considerable instability, which may respond dramatically to fluctuations in [its] environment”, with a maximum elevation of 3 meters (~ 10 feet), made of constantly shifting sand that collects around a small rocky outcrop surrounded by a shallow reef. The area of the cay that supports vegetation, the main source of shelter and food for the melomys, has been shrinking since 1998, down to less than 10% of the 1998 area in 2014.

The main contributing factor to this degradation is the success of other species, primarily the Green Turtle and various sea birds, both of which use the island for nesting (and roosting) which resulted in increasing disturbance and destruction of the vegetation required by the melomys for survival.

Bramble Cay suffered at least one (Spring 2014) or more (or a series of) weather events that inundated the island (maybe repeatedly), that possibly would have reduced the melomys population below a sustainable level, both directly and through destruction of vegetation, their primary food source, however, it is doubtful that there were in fact any remaining melomys at that late date. No melomys had been official recorded on Bramble since 2004.

The official cause -- climate change – is speculative and partially based on predictions of future sea level rise and future increased storminess and intensity of storms.

It is this author’s opinion that the human contribution to their extinction is limited to the utter inadequacy of the [Recovery Plan for the Bramble Cay Melomys, *Melomys rubicola*](#) prepared by Peter Latch in 2008.

<BLOCKQUOTE>

Many readers will be satisfied with this summary, having already seen other posts on this topic. Those who have a deeper interest – in the facts and processes that produce a misleading government report – are encouraged to read the full report which contains extensive data and photos, but ONLY if you are extremely interested – if not, you will be bored silly.

The Long Version of this essay is available here in pdf format.

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The Gruesome Details:

The story of the Bramble Cay (say “key” -- some say “kay” – both are correct) melomys ([click to pronounce](#)) makes interesting reading. It is a lesson in critical thinking, critical reading, and a demonstration of how a pervasive world-view can alter the conclusions of a scientific investigation.



Bramble Cay, date unknown but believed circa 2002-2004
The light tower is 17 m (50 ft), vegetation is approximately 12 inches high.

The Bramble Cay melomys (BCM) is a rodent, much like other small rodents we are familiar with – various mice and rats. It is most properly called [the Bramble Cay mosaic-tailed rat \(*Melomys rubicola*\)](#) and is in the family [Muridae](#), subfamily *Murinae* which comprises the “Old World rats and mice”, genus *Melomys*.

What exactly constitutes a “species” is a matter of controversy in the world of biology and taxonomy. I exchanged emails with a prominent biologist several years ago on this issue and the final outcome was the admission that “biology doesn’t really have a solid working definition of ‘species’”. A couple of current examples will suffice:

“[Defining a species](#) -- A species is often defined as a group of individuals that actually or potentially interbreed in nature. ... That definition of a species might seem cut and dried, but it is not.”

“[1. Biology](#) A group of closely related organisms that are very similar to each other and are usually capable of interbreeding and producing fertile offspring.”

“[Species Definition](#)

1) The lowest taxonomic rank, and the most basic unit or category of biological classification.

(2) An individual belonging to a group of organisms (or the entire group itself) having common characteristics and (usually) are capable of mating with one another to produce fertile offspring. Failing that (for example the 'Liger' [a cross-breeding of the lion and tiger]) it has to be ecologically and recognizably the same."

To avoid getting bogged down in that mess, it is safest to concede that for our purposes here the Bramble Cay melomys is species in its own right – it is officially listed as one – and it is certainly a distinct breeding population of melomys, reportedly with "some protein differences and a coarser tail caused by elevated scales." If we allow the definition of BCM as being only "those melomys that lived and bred on Bramble Cay" then we can safely concede that they are now extinct – there are no more melomys on Bramble Cay. In fact, it is questionable that there have been any melomys on Bramble Cay since 2009-2010, when a casual search of the cay possibly sighted one or two individuals – none have been officially sighted or trapped since 2004, despite extensive efforts.

The Bramble Cay melomys has been an object of conservation concern for some time. In 2008, Peter Latch, acting for the Queensland (Australia) Environmental Protection Agency, wrote "[Recovery Plan for the Bramble Cay Melomys *Melomys rubicola*](#)". This 20 page document lays out the current worrisome state of the Bramble Cay melomys up to that time and establishes a plan that was wholly inadequate, even self-referentially. Inadequate it may have been but – sadly, in retrospect -- it gives a great deal of interesting background information about Bramble Cay and the Bramble Cay melomys.

In reality, recovery may have been beyond possibility already in 2007-2008. The only sighting of melomys on Bramble Cay since 2007 is in a "personal communication" from E. Stewart who reportedly saw 1 or 2 melomys in late 2009 through "casual searching". Prior to that, the population estimate was less than 100 in 1998 and both extensive trapping survey efforts in 2002 and 2004 found only a dozen individuals.

Some excerpts from the Executive Summary of recovery plan (published 2008):

"Bramble Cay melomys, *Melomys rubicola*, a small rodent of uncertain origins, is morphologically distinct from other Australian melomys. With a population of less than 100 individuals inhabiting a single small sand cay whose existence is threatened by erosion, the Bramble Cay melomys is one of the most threatened mammals in Australia."

"The small population size and the naturally unstable nature of Bramble Cay has led to the species being listed as 'Endangered'..."

"Bramble Cay is a small (approximately 5ha), vegetated sand cay surrounded by reef and located in the far northeast of the Torres Strait, about 50km from the mouth of the Fly River in PNG [Papua New Guinea]. Vegetation consists of low herbaceous cover to about 40cm in height. It is intermittently broken by bare patches of compacted guano depressions that hold water during the wet season. Bramble Cay melomys appear to

primarily inhabit the vegetated portion of the cay, an area of about 2.2ha [hectares]. Eleven plant species have been recorded however composition varies from year to year. **Bramble Cay is also the largest nesting site of green turtles in the Torres Strait and supports the only large seabird colony in the region.** [emphasis mine –kh]

As for the mention of the seabird colony, Latch (2008) records that “Capture success [of BCM, population surveys by live trapping] recorded by Dennis and Storch (1998) **was highest on the edge of the vegetation or outside areas of high seabird density.** The 2014 report records a nesting bird population of **14,000-18,000** birds during the survey. Of course, by 2014, there may have not been any melomys left to suffer from the competition.

These two tables tell the story:

Table 2. Chronology of Bramble Cay melomys abundance from assessments made on Bramble Cay since the 1970s.

Time Period	Sampling Effort	No. of Individuals Recorded	Reference
Dec 1978	Spotlighting	Estimated max. of several hundred	Limpus <i>et al.</i> (1983)
July 1998	444 trap-nights	42 (estimated pop. of 93)	Dennis & Storch (1998)
Nov 2002	444 trap-nights	10	Latch (2008); P. Latch (pers. comm.)
Nov 2004	444 trap-nights	12 (last known capture)	Latch (2008); P. Latch (pers. comm.)
Late 2009	Casual searching	1-2 (last known record)	E. Stewart (pers. comm.)
Dec 2011	150 trap-nights Spotlighting Daytime searching	nil	Waller <i>et al.</i> (2014); N. Waller (pers. obs.)
Nov–Mar 2013	3 camera trap-nights	nil	S. Preston (pers. comm.)
Mar 2014	120 trap-nights Spotlighting Daytime searching	nil	Gynther <i>et al.</i> (2014a)
Aug–Sep 2014	900 trap-nights 60 camera trap-nights Daytime searching	nil	This study

Table 1. Chronology of vegetation extent on Bramble Cay from assessments made since 1998.

Time Period	Vegetated Area (ha)	No. of Plant Species Present	Reference
July 1998	2.43	4	Dennis & Storch (1998)
Nov 2004	2.16	4	Latch (2008); P. Latch (pers. comm.)
Dec 2011	1.1	3	Waller <i>et al.</i> (2014); N. Waller (pers. obs.)
Mar 2014	0.065	6	Gynther <i>et al.</i> (2014a)
Aug–Sep 2014	0.19	2	This study

In 1998, when the Bramble Cay melomys population is estimated at 100, there are 2.43 ha of vegetation. In 2004, with vegetated area reduced to 2.16 ha, the last known capture of melomys takes place, finding only a dozen specimens. “Repeat surveys in 2002 and 2004 recorded 10 and 12 individuals respectively, and **annual visits to the cay by turtle researchers since 2007 have failed to detect any presence of the species at all.**”

Latch (2008), in the [Recovery Plan](#), puts forward his idea of a climate change effect:

*“Limpus et al. (1983), Ellison (1989) and Dennis and Storch (1998) have assessed these changes [in size and shape] over time. Limpus et al. (1983) concluded that the cay was moving towards the northwest at a rate of 0.44m/year and losing sand over the edge of the reef flat and that in time, the cay will drop off the reef flat into deeper water. Ellison (1998) concluded that the shape of the cay had not substantially changed since the 1970s, with **the most significant change being a reduction in the vegetated area.** Similarly Dennis and Storch (1998) concluded that while there was net loss up until 1972 there has been little or none since then. Measurements undertaken by EPA in 2002 and 2004 support this, with the cay’s area in November 2002 measured at 5.10ha and in November 2004 at 5.50ha (QPWS unpub. data).”* [areas quoted are for the entire cay – not vegetated area – kh]

*“Although no specific assessment of this threat has been undertaken, **the likely consequences of climate change**, including sea-level rise and increase in the frequency and intensity of tropical storms **are unlikely to have any major impact on the survival of the Bramble Cay melomys in the life of this plan.** However, the shallow nature of the island and reef environment makes Torres Strait potentially vulnerable to the effects of climate change, including loss of land through sea level rise and subsequent flooding and coastal erosion, and changes to habitat and species composition.... Unusual or changing weather patterns in the area resulting in stronger winds, large storm surges and extremely high tides, possibly due to climate change may impact on a number of species*

(e.g. green turtles, seabirds and the melomys) that inhabit and/or use the island over time.”

In 2009, when we might assume the vegetated area had approximately halved, no official survey was done but there is an anecdotal report of a visitor to the island seeing 1 or 2 individual melomys.

Between 2009 and 2014, the best documented surveys of Bramble Cay, Bramble was visited by Natalie Waller, Ian Gynther and others in December 2011. They find the vegetated areas greatly reduced:



BRAMBLE CAY IN 2009 (LEFT) AND 2011 (RIGHT). THE VEGETATION HAS NOTICEABLY SHRUNK, POSSIBLY THANKS TO THE ACTIVITIES OF TURTLES AND SEABIRDS. KAREN EVANS & NATALIE WALLER

Tyrone Lavery, one of the researchers on the island in 2011, [reported](#)

“Habitat loss via erosion of the cay is the single most important threat, particularly given that sea levels are predicted to rise [thanks to climate change](#). Bramble Cay is by no means stable. Between 1958 and 1987, the cay decreased in size; but in 2011 it had returned to a size comparable to 1958. [the implication is that the island would possibly, eventually, be submerged or washed away -- kh].

While the size of the cay varies, the vegetation on it is shrinking, and this might be the main cause of the melomys' decline.

Bramble Cay also serves as a rookery to marine turtles and seabirds. The vegetation is disturbed by nesting seabirds throughout the year and by turtles between October and March. In our December 2011 survey the area disturbed by turtles was quite extensive, and many turtles were nesting towards the centre of the cay. Photos show a substantial reduction in the cover of vegetation between 2009 and 2011.”

No melomys were discovered on the cay in 2011. Images included in [Lavery \(2011\)](#) show that nesting birds, brown boobies, sooty terns and common noddies, perching on the live traps set for melomys, pecking at rat lures (tea balls filled with peanut butter and syrup), setting off camera traps, both day and night. The nesting bird population on Bramble was estimated at 18,000 during the Aug-Sept 2014 survey.

Two years later, in March 2014, when researchers again arrive, the island has obviously been seriously inundated in the recent past:



VIEW SOUTH-EAST FROM THE LIGHTHOUSE TOWER IN MARCH (LEFT) AND SEPTEMBER (RIGHT) 2014. THE CONCRETE BLOCKS OF THE FORMER LIGHTHOUSE TOWER AND THE EXPOSED PHOSPHATIC ROCK OUTCROPS, VISIBLE AT THE VERY TOP OF EACH PHOTO, PROVIDE REFERENCE POINTS. CHANGES IN THE PRESENCE AND DISTRIBUTION OF BEACH-WASHED LOGS AND OTHER TIMBER ARE EVIDENT, AS IS THE ABSENCE OF LIVING SEDGE *CYPERUS* SP. AND TURTLE NEST EXCAVATIONS IN SEPTEMBER. NOTE THAT TIDE HEIGHTS WERE DIFFERENT WHEN THESE TWO PHOTOS WERE TAKEN. (PHOTO: IAN GYNTHYER)

This aerial view of half the island shows the condition in early September shows clear evidence that water flowed over part of the vegetated area of the cay:



2j. Wide view of the swale with dead *Portulaca oleracea* adjacent to the cay's northern shoreline, taken from the lighthouse tower. The arrows indicate the apparent direction of seawater flow. Locations of piles of dead bird eggs (asterisks) and bird eggs combined with timber flotsam (dots) are shown. (Photo: Ian Gynther). SEPTEMBER 2014

Again, in late 2014, no melomys, nor any sign of melomys – no nests, no feces, no skeletons – were found.

Conclusions:

In my opinion, based on all the evidence available the published reports mentioned here, it is unlikely that melomys existed on Bramble Cay as late as 2010. Their demise may have occurred as early as 2005/2006.

While there was certainly a major storm driven inundation of much of Bramble in late 2013/early 2014, there is no particular reason to believe this event to be the death blow to the melomys of Bramble Cay and certainly no reason to assert that such a storm is the result of Climate Change, as opposed to simple weather.

Rather, the timeline of surveys of Bramble Cay seems to point to a continuing reduction of vegetation over a multi-year period – vegetation used by the melomys for shelter and as the main, possibly only, source of food. I am in agreement with Waller, Lavery and others that this reduction as being due to the increasing encroachment of Green Turtles nesting higher and higher on the island and the presence of huge flocks of roosting and nesting sea birds which damage vegetation [and I suspect, harass melomys].

Despite correct assessments of population sizes and the existing threats to the species, it is possible that accepting climate change as the primary threat created a situation in which nothing immediate needed to be done.

By the time the 2004 turned up only a handful of melomys on Bramble, it should have been obvious that an urgent, immediate action was required if the species was to be preserved.

The Recovery Plan (2008) underestimated the seriousness of the plight of the Bramble Cay melomys. It should have, but did not, call for an emergency expedition to trap enough remaining melomys to start a captive breeding program to ensure their continued existence. Even if it had, it was probably too late – their might not have been any remaining melomys to capture – but there was a slight chance that an all-out immediate effort might have been able to capture a handful of individuals to keep the species going. Better yet, the effort should have been mounted very soon after the 2004 survey.

Thus, the primary causes of the extinction of the Bramble Cay melomys can be put down to 1) competition for scarce resources on a tiny, shifting island – a competition in which green turtles and sea birds are the winners and melomys the losers and 2) human error in failing to create and carry out a timely workable, appropriate recovery plan for a species known to be at immediate risk of extinction.

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