Published online 21 July 2010 | Nature | doi:10.1038/news.2010.366

News

# Marmots fatten up on climate change

**Rodent population boom linked to bigger bellies and longer summers.**

Lucas Laursen

In the Upper East River Valley of Colorado's Rocky Mountains, yellow-bellied marmots (*Marmota flaviventis*) are thriving thanks to climate change. The rodents' startling population boom — their numbers have tripled in ten years — has now been linked to the increasing size of their bellies, which is probably caused by climate-driven changes in hibernation patterns.

A yellow-bellied marmot pup

*Raquel Monclus*

Arpat Ozgul, an ecologist from Imperial College London, and his colleagues examined 33 years' worth of detailed records to track how the gluttonous rodents were gradually getting heavier. The results, published in *Nature* today[1], show that the marmots grew from an average of about 3.1 kilograms in the first half of the study, to 3.4 kilograms in the second half.

The causes of this weight gain are not entirely clear, but the team's data showed that it was not because heavier marmots bred more and passed on their tendency to be large to their offspring. Instead, all marmots got heavier — an effect assumed to be the result of more warm days each year caused by climate change, which gave the marmots longer to grow. "There's a general consensus that the summers have been getting longer in the area," says Ozgul. Previous work has shown that, with rising temperatures, marmots emerge earlier from hibernation and give birth earlier in the growing season[2].

Ozgul sought to link this extra weight to a general population growth observed among marmots at a private research station in Colorado from 2000 onwards. "The link between a phenotypic trait [such as body mass] and a population dynamic is critical if you want to understand the effect of climate change on population," explains Stephanie Jenouvrier, a population biologist at the Chizé Centre for Biological Studies in France.

Using a population model previously tested only on plants[3], Ozgul's team evaluated the impact on the overall size of the population of factors such as an individual marmot's body mass, growth rate and chance of reproducing. They concluded that improved survival among older marmots during the winter had the biggest effect, and that this hardiness was partially driven by greater body size.

## Sudden spurt

The model does not explain why a gradual change in body mass should translate into a sudden population spurt, rather than the two rising together. "We're assuming the marmots crossed a threshold," Ozgul says. "Next we have to look in more detail at the lagged effects of environmental factors and population density." Such environmental factors include snow cover, the length of the growing season, temperature and humidity.

"I would like to see a plot of temperature at that site over this whole period," says hibernation researcher Roelof Hut of the University of Groningen in the Netherlands. He adds that the present study links the observed change in body mass to the population boom but does not try to establish why the marmots are getting fatter in the first place. The marmots may, for example, have changed what they eat, not just the length of time in which they eat, writes Marcel Visser, an ecologist at the Netherlands Institute of Ecology in Heteren, in a News & Views article that accompanies the study in today's *Nature*[4]. The population of one of the marmot's foods, tall bluebell flowers, began to decline in 2000, just before the marmot population surged; this might have altered the marmots' diet, leading them towards fattier foods.



Still, the ability to take weight gain and other individual responses to environmental change and link them with group-level population change will be important for predicting the effects of climate change on other populations, says Visser. Ozgul and his colleagues have previously found that environmental shifts are linked to size changes in sheep in the Scottish archipelago of St Kilda, where individuals from each generation were smaller than their predecessors[5].

The marmots may not enjoy a permanent population boom. Ozgul says that his team is on the lookout for longer-term effects, such as drought-induced food shortages or predation by coyotes and foxes, which might check the population. "Most ecological studies last 2–3 years, the fieldwork of a graduate student, but

these animals live 14 years. If you were to study the effect of climate change [a typical, short-term study] would tell us nothing," he says.

### References


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i guess if anyone has more time to eat, he/she/it could fatten up. **#12216**

that in turn means if climate changes, most living things, which are nornmally restricted in growth by their enviromental changes from warm to cold, now getting bigger and fatter. i do not want to see those rats in four years running through new yorks subway.

if in the global setting most creatures getting bigger, oxygen consumption should increase and would this in turn change composition of the air we breathe? it would be interesting to think to the end of this chain reaction.

and i do not like giant spiders.

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