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Climate Change versus Groundhogs: Even Common Species Will Suffer

By John R. Platt | June 13, 2013

A warming world will present Punxsutawney Phil and his cousins with a host of new challenges, possibly enough to put some species at risk of extinction. According to research published last month in the journal *Natural Science*, climate change will bring temporary benefits to several of the world's 15 marmot species (including the groundhog), but any gains will quickly be offset by climate-driven drought, shifts in edible vegetation and habitat loss. "If climate change is not mitigated, then extinction becomes a real threat," says the paper's author, [Kenneth B. Armitage](#), professor emeritus at the University of Kansas in Lawrence, who has spent the past 40 years studying marmots.



A groundhog, one of the 15 species of ground squirrels known as marmots

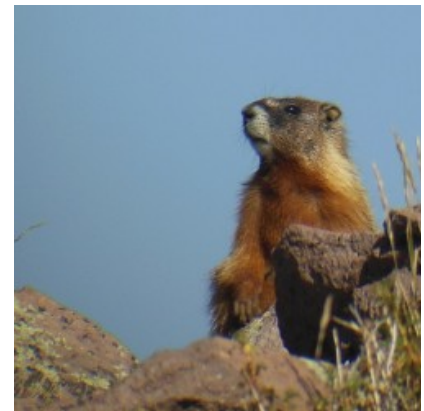
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So, what's a marmot? You've no doubt seen groundhogs (*Marmota monax*, also called woodchucks or whistlepigs) on TV every February or in a certain Bill Murray movie. The rest of the species all look fairly similar. Marmots are actually large ground squirrels and are closely related to prairie dogs. The 15 species—three of which are endangered, one critically so—live throughout most of the Northern Hemisphere, where they have adapted to cold, inhospitable habitats by hibernating through the winter.

It's their specialized habitat use that puts marmots at risk, Armitage says. As he wrote in his paper, "Most marmot species occupy a harsh environment characterized by a short growing season and a long, cold season without food." Many species become highly stressed by high temperatures and breed poorly during times of drought. Any change in amount of duration of annual snow cover can also be deadly, because the marmots' fat reserves are usually carefully balanced for the weather to which they have long become adapted.

Although all marmot species resemble each other and occupy similar habitats, Armitage is quick to point out that "one cannot extrapolate from one marmot species to another; there is too much difference in life histories." But because most of these species live in high-elevation alpine regions, he believes that climate change will push many marmots higher and higher as low-elevation temperatures warm. As has already happened with other mountain species, such as the [American pika](#) (*Ochotona princeps*), the marmots will find inferior vegetation and ever less space the higher they climb. "I think that high-elevation populations in western North America are threatened, particularly the Olympic marmot and the Alaska marmot," Armitage says. "They have nowhere to move as their high alpine meadows either become tree-invaded or winter snow is too thin to provide adequate winter insulation."



The yellow-bellied marmot

Neither the Olympic marmot (*M. olympus*) nor the Alaska marmot (*M. broweri*) are currently endangered, but Armitage believes that two endangered species—the Vancouver Island marmot (*M. vanancouverensis*) and the Menzies's marmot (*M. menziesi*)—face serious threats. The critically endangered Vancouver Island marmot only numbers 350 to 400 animals in the wild, according to a [recent update](#) from the Marmot Recovery Foundation.



Two critically endangered Vancouver Island marmots

Although Armitage makes no predictions for when marmots will feel some of the worst effects of global warming, some changes are already apparent. “We know that the yellow-bellied marmot (*M. flaviventris*) has already evidenced an upward movement of its lower elevational boundary in California,” he says, “and I expect that may be happening in other low-elevation populations, especially in eastern Oregon and Washington [State].” Unfortunately, he does not know of anyone currently monitoring those low-elevation populations, so it’s hard to say for sure what’s happening to them so far.

Other changes are also underway. The average litter size of alpine marmots has continually decreased over the past 20 years, according to research published this past April in the journal *ESA Ecology*. The study found that winter snow cover in the French Alps has thinned, reducing insulation for hibernating marmots. The animals faced colder temperatures in their burrows, forcing them to deplete their fat reserves more quickly. Mother marmots that left hibernation with lower body mass produced smaller litters, the study found.



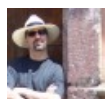
The Alpine marmot

Researchers observed the opposite effect a few years ago. A study of yellow-bellied marmots in the Upper East River Valley of Colorado’s Rocky Mountains found that the animals not only enjoyed a recent population boom, they also got an average of 0.3 kilogram heavier. The research, published in *Nature* in July 2010, theorized that an increased number of warm days gave the marmots more time to grow. This could be one of those temporary benefits that Armitage mentions in his paper. (*Scientific American* is part of Nature Publishing Group.)

Like a lot of species we see every day, groundhogs and most other marmots are probably too common to become truly endangered by climate change. But as Armitage points out, low-elevation populations will undoubtedly suffer and quite possibly disappear as the world gets warmer. Species like the Vancouver Island marmot may not make it at all. If the trend doesn’t reverse quickly on a global scale, that’s a fate that not even Bill Murray will be able to turn around.

Photos: Groundhog by Alan Moote. Yellow-bellied marmot by Ken Schneider. Alpine marmot by North Cascades National Park. Vancouver Island marmots by Jen Newman. All used under Creative Commons license

This marks my 500th Extinction Countdown article for *Scientific American*, and my 1,065th overall. I want to thank you for reading, my editors and everyone else at SA for their support, and all of the great scientists and conservationists out there whose work amazes me every day. Sadly, even with more than a thousand articles under my belt, I still have many, many species to write about, and the threats they all face continue to grow. Writing about endangered species comes with a price: it’s a task that never ends. I hope you’ll stick with me. We have a lot more work to do.



About the Author: Twice a week, John Platt shines a light on endangered species from all over the globe, exploring not just why they are dying out but also what’s being done to rescue them from oblivion. Follow on Twitter [@johnrplatt](#).

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