

Science

## Habitat changes expected to shift distribution of tiny mammals in Alaska

Yereth Rosen | Alaska Dispatch News | August 23, 2015

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A northern red-backed vole climbs down a tree. Voles and other small mammals will shift their distribution within Alaska as changes to climate affects the animals' habitat.

Todd Paris / UAF

The plight of [polar bears](#) and [walruses](#), big and charismatic animals struggling with rapid changes to the far-north climate, is well known. Less publicized are the effects of a warming climate on many tiny, furry mammals that scurry across the floor of Alaska's boreal forests or the open tundra or coastal plains.

Those animals -- shrews, voles, mice and lemmings -- are expected to shift their distribution across Alaska in coming decades as the climate warms and vegetation and habitat types creep northward, says a [new study](#) published in the journal [PLOS ONE](#).

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The study, by scientists from the University of Alaska Fairbanks, used more than 112,000 records for 17 types of small mammals. They evaluated, observed and predicted for areas around the state where the small mammals are found. And they calculated the distribution changes that are expected to happen by the end of the 21st century as forests, coastal plains and tundra areas are transformed by a warming climate.

The small mammals have adapted to specific habitats, so "they're going to be affected by the change in vegetation," said co-author Andrew Baltensperger, of UAF.

In all, the different types of rodents and shrews are expected to move away from some coastal regions -- the Yukon-Kuskokwim Delta and the Seward Peninsula -- and move into the western Brooks Range and the Beaufort central plain, the study found.

Small mammals that use especially cold habitats, including the Interior and the northern section of Alaska, are likely to lose ground, the results found. Their population distribution is expected to shrink by about 20 percent in area. Tundra shrews will be particularly hard hit, losing nearly two-thirds of the area where they were distributed as of 2010, according to the findings. Distribution of North American brown lemmings and red-backed voles will also shrink in area, by roughly a third, the study found.

But other small mammals that dwell in the southern and warmer parts of Alaska are expected to spread out over new territory, increasing their distribution by nearly 30 percent on average. The biggest winner, according to percentage of distribution gained, will be the American water shrew, increasing the area of its distribution by about 65 percent, according to the study findings.

In general, diversity of small-mammal populations will decrease in some coastal regions -- the Yukon-Kuskokwim Delta and the Seward Peninsula -- and increase on the Beaufort coastal plain and in the western Brooks Range, the study found.

The shifts in small mammal populations could have big ripple effects, the authors say.

Those tiny animals make up much of the diet of meat-eating raptors and land mammals like coyotes and foxes. "There's a big list of predators who depend on them for food," Baltensperger said.

The small mammals also help churn the soil and spread seeds in it, the study notes. And they have complex social structures that are still somewhat mysterious.

"The same complexities that you find in chimpanzees and gorillas you find in small mammals," said co-author [Falk Huettmann](#), with UAF's Institute of Arctic Biology. "There is so much going on there, and we don't understand it."

Though these animals are small -- and often ignored by policymakers -- they are important to the whole ecosystem, Huettmann added. "Their well-being obviously matters, a lot," he said.

As Baltensperger, Huettmann and two colleagues found in a [related study](#), many of the studied species can eat the same foods but have developed niche diets. Over time, the populations have shifted to different habitats in different locations, where they subsist on slightly different mixes of food, Baltensperger said. "That has allowed them to coexist," he said.

But as biomes shift higher in latitude and altitude, there are increased risks of crowding and

competition among small-mammal populations, he said. For now, it is difficult to predict which species will win out if there is competition, he said. "How well can they make do with whatever habitats are there, even though it may not be something that they're used to?" he said.

One biome that is changing dramatically is the boreal forest of the Interior Alaska region. Some of those habitat changes are already apparent, said Baltensperger, who has traveled around the state to study the tiny mammals. "What I did see floating on the Yukon River was a lot more deciduous forest than I expected," he said

It is possible that the forest that was once dominated by spruce and other evergreens will transform into a more mountain-like mix, he said. It is unclear what the boreal forest will become, he said. Some scientists have suggested a "no-analog" system will emerge, "something completely new to us," he said.

The findings in the latest study by Baltensperger and Huettmann line up with those in a [separate study](#) on expected wildlife distribution changes in northwestern Alaska. That study, by researchers from the U.S. Forest Service, U.S. Geological Survey and other organizations, found that expected vegetation and habitat changes in that region [will benefit tree-dwelling species like goshawks but hurt small, burrowing mammals](#) that need open space, feed on low-lying plants or use coastal or river habitat.

Crowding, competition and habitat-related distribution shifts have been observed among other northern mammals.

Arctic foxes' tundra territory, for example, has been [encroached upon](#) by bigger and [more aggressive red foxes](#). On Alaska's North Slope, that shift has been [accelerated by food waste](#) left in garbage dumps by people working in and around the oil fields, one [study](#) found.

Farther south, arctic squirrels have disappeared from the boreal forest in the southern part of Canada's Yukon, a collapse attributed in [one recent study](#) to increased predation. The study, published in the journal [Wildlife Research](#), said it is likely that the once-plentiful forest squirrels have fallen into a "predator pit" because a warmer winter climate has allowed shrubs to expand in the boreal forest, reducing squirrels' ability to see and avoid the animals that hunt them.

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