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# Big Changes Predicted in Alaska Climate by 2100

More than half the ecosystems in Alaska will look much different by the end of the century, according to a new study at UAF.

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FAIRBANKS - More than half the ecosystems in Alaska will look much different by the end of the century, according to a new study at the University of Alaska Fairbanks.

Changes in climate could alter the habitat of many species of plants and animals, skewing their range and population across Alaska.

The study predicted potential outcomes, such as the end of the Alaska marmot and an invasion of reed canary grass across much of the state.

More than half the coast of western Alaska could change from tundra into something like western British Columbia. And by 2100, the climate in the Interior might resemble the Mat-Su climate today.

"The most interesting thing is to realize how much potential change we might see in Alaska within our own lifetimes," said Nancy Fresco, an ecologist at Scenarios Network for Alaska Planning at the University of Alaska Fairbanks.

Fellow researchers were the U.S. Fish & Wildlife Service and the Ecological Wildlife Habitat Data Analysis for the Land and Seascape.

"We're kind of at the cutting edge of climate change, and the effects are exaggerated in the Far North and the Arctic," she said.

The study is geared toward land managers who are trying to conserve or control wildlife populations. These species need more than pockets of food and shelter; they also require connections to the habitats they use.

Changes in one ecosystem can make entire regions inaccessible to certain species or skew the ranges of others.

Researchers

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picked four species - caribou, Alaska marmot, trumpeter swans and reed canary grass - with different sensitivities to climate change.

Caribou, for instance, are highly adaptable and have few migration constraints. Though their range is expected to shrink and move northeast, researchers think they will adapt to new habitat just as they have in the past.

Alaska marmots, on the other hand, live in rocky alpine areas like the scree fields of the



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Brooks Range. In winter, they hunker into dens. Their habitat is likely to shrink 87 percent by 2099.

"As things get warmer, essentially the warmth is forced upslope," Fresco said. "And the tops of mountains are smaller than sides of mountains."

Trumpeter swans, which require 138 ice-free days to fledge their young, could benefit from longer summer seasons.

"It looked as if the potential habitat of trumpeter swans might expand," Fresco said.

Local and state effects

As with the animal kingdom, some parts of Alaska will be affected more than others. The Interior shouldn't experience radical changes.

"There will probably continue to be trumpeter swans. We don't have the grass here now, but we might start seeing it," Fresco said.

Fairbanks also could become more attractive to pests like the spruce bark beetle, which chewed through the Kenai Peninsula earlier this decade.

"If we start to lose our negative-40s or negative-50s, not only are we looking at potential changes in vegetation and ecosystem and habitat, we're looking at becoming much more welcoming to invasive species," she said.

The Arctic and the Northwestern boreal regions are predicted to shrink by nearly 70 percent and be replaced by new ecosystems. Less than 2 percent of the western tundra could remain unchanged - even without sea level rise expected from melting ice.

"The most surprising thing was actually thinking about western coastal Alaska and how uncertain the ecosystem may be," Fresco said.

Weather data

Researchers input temperature and precipitation numbers from June and December into climate models to generate future climate data.

The models are based on how much carbon likely will be in the atmosphere in future years (using cautiously optimistic levels).

They gathered habitat information on caribou, swans and marmots from scientific field surveys.

Still, the report gives potential - not certain - outcomes.

Models are not perfect predictors of animal behavior because they ignore factors such as competition, food supply and human interaction, said Karen Murphy of Fish and Wildlife Service.

"Models should always be looked at as tools to help people envision what the future may be like, rather than as reality," she said.

It's also hard to predict how long it will take for different species to react to climate changes.

"Something like a caribou or swan could pick up and move immediately because they're migratory, whereas spruce trees have long life cycles and their seeds can't disperse that far," Fresco said.

The future

Many other factors could be included in the study, such as melting permafrost, sea level rise and wildfire, Murphy said. Other colonies and species also could be added.

This study is merely the first layer in painting a picture of the future, and researchers hope that scientists and indigenous communities will add more color and detail.

It reminds everyone in Alaska that the trees, plants or wildlife around them are subject to change, Fresco said.

"The species they enjoy hunting or fishing or watching may not be here for their kids, but a different species may be," she said.

Contact staff writer Molly Rettig at 459-7590.

For the full report, titled "Connecting Alaska Landscapes into the Future," visit <http://www.snap.uaf.edu/downloads/connecting-alaska-landscapes-future>.



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