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Study: Climate change and drought killing off Mojave Desert birds

By Miranda Willson (contact)

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Shrinking water resources due to climate change are driving major declines in Mojave Desert bird populations, according to a new study from researchers at University of California, Berkeley.

Spanning 48,000 square miles in Southern Nevada, southeastern California and northwest Arizona, the Mojave Desert has been receiving less and less rainfall over the last century because of climate change, the study notes. Bird populations in the region have also been decreasing, but the exact connection between those trends was not previously clear to scientists, said Steve Beissinger, co-author of the study.

By simulating how much water 50 common Mojave birds need to cool off during the hottest hours of the day, Beissinger's research team found that access to sufficient water resources for cooling purposes greatly impacts birds' survival rates. As the climate gets hotter and dryer, birds will need more water to keep cool.

"That's kind of a fundamental finding that was really interesting, because most of the time, we haven't been able to find a direct, physiological link between climate change and declines of species," said Beissinger, a professor of ecology and conservation biology at UC Berkeley.

Led by UC Berkeley postdoctoral scholar Eric Riddell, the study built off historical data and a similar study conducted by the same team of researchers last year. That study found that 30% of 135 common Mojave Desert bird species declined significantly over the last century, while only one species — the common raven — saw an increase, Beissinger said.

For the new study, the team looked at 50 of those 135 species and found that birds with the highest cooling requirements have generally experienced the greatest decline in the last 100 years.

Species size and diet were the main factors influencing survival rates, the team found. Large birds need more water to cool off, while carnivorous and insectivorous birds get their water primarily from their food sources. Hotter, dryer temperatures mean that those species now need to find more food to keep cool, Beissinger explained.

The American kestrel, turkey vulture and western bluebird were among the insectivores and carnivores with the highest cooling requirements that declined the most in the studied areas.

The mountain chickadee, black-throated sparrow and canyon wren were some of the seedeaters and omnivores with lower cooling costs that declined the least, Beissinger said.

In addition to climate change-driven reductions in precipitation, groundwater pumping in the Mojave could be a factor driving bird declines, according to the study. Many omnivorous and seed-eating birds get most of their water from increasingly scarce springs and surface water, Beissinger said.

“Springs and surface water have been disappearing throughout the Mojave, partly by climate change and partly by groundwater pumping over the last century,” Beissinger said. “So it’s getting harder for these species to find the water they need to offset changes that have happened in the environment.”

The loss of spring and surface water also affects insectivorous and carnivorous birds, because lower water levels could be driving habitat loss for those birds’ prey, Beissinger added.

Published Sept. 30 in the Proceedings of the National Academy of Sciences, the study is significant because it highlights how climate change is impacting bird species that aren’t necessarily considered endangered, said Patrick Donnelly, Nevada state director for the Center for Biological Diversity.

“This is affecting every bird,” he said.

Donnelly sees the study as compelling evidence for the need to prevent habitat loss, keep sprawl in check and reduce greenhouse gas emissions in Southern Nevada.

“We need to take this as a screaming alarm bell that we need to take bold, decisive action on climate and need to do it immediately,” he said.

The study also suggests that the impacts of groundwater pumping on water resources are far-reaching, Beissinger said. Most of the study area covered protected lands, such as Joshua Tree National Park, Death Valley National Park and the Mojave National Preserve. Although those areas are at least 50 miles from Las Vegas and other major urban centers, less ample groundwater was still observed there.

“So much of our groundwater system is connected that the pumping out of groundwater is probably having a negative effect in a much greater area,” Beissinger said. “We probably need to be a lot more judicious in giving permission to future pumping out of the groundwater.”

To help more bird species survive in a warmer, dryer climate, local parks and nature preserves could install water-catching systems or artificial springs, which would benefit whole ecosystems, Beissinger said.

“If you have positive effects in ecosystems, that should at least do something to sort of mitigate the problem,” he said.

Even though Beissinger’s team only looked at birds, Donnelly expects that drops in bird populations are impacting other natural resources and overall biodiversity in Southern Nevada.

“It’s not like if all the birds disappear, we’re just going to be sad because there’s no birds tweeting out our window,” Donnelly said. “If all the birds disappear, our clean air, clean drinking water and our food are likely very closely following behind that.”