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## **SPECIES: Sagebrush study shows some varieties are adapting to climate change**

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**Elizabeth Harball, E&E reporter**

When it comes to inconsistent rainfall brought on by climate change, plants of the same species living in different climates could hold the key to adaptation.

New research by scientists at University of California, Irvine, shows that a kind of sagebrush living in the southern part of the state is more resilient to rainfall changes than plants of the same species found in the northern portion of its range. As precipitation becomes more sporadic in Northern California due to climate change, this finding could aid efforts to preserve one of the state's most unusual ecosystems.

California sagebrush, a scrubby, gray-green plant unique to California state and Mexico's Baja California Peninsula, is a key species in the coastal sage scrub ecosystem. Many animals rely on the plant for survival, including the endangered California gnatcatcher, said Jessica Pratt, doctoral candidate at UC Irvine's Department of Ecology and Evolutionary Biology, who co-authored the study.

"It is one of the species that has more direct interaction with any of the other species in its habitat -- it's the species for which coastal sage scrub is named, in fact," Pratt said. "California sagebrush, in particular, forms a foundation of the food chain for many bird species."

More than 300 different insect species both live and feed on the plant, Pratt explained, and many native birds rely on those insects as a food source.

California sagebrush faces numerous threats, including habitat loss and climate change, and about 10 percent of the plant's original habitat remains. The impact of climate change is being felt most acutely in the north, the study found, because sagebrush there can no longer rely on the region's historically stable rainfall.

### **Differences within a species**

Looking at long-term climate data, the researchers found that significant climate variations were already taking place at three weather stations in Northern California, "where the plants are probably the least able to deal with it," Pratt said.

But Pratt and her research partner, Kailen Mooney, also of UC Irvine, discovered that California sagebrush sampled from southern populations has already adapted to sporadic precipitation, a pattern that occurs naturally in that area. While plants collected from northern populations grew the same regardless of the amount of water they received, sagebrush from the south demonstrated that it can thrive in more uncertain conditions.

"When we put southern plants in the dry and the wet, they did very different things," said Pratt. "When you increased the watering for them, they were able to grow much more -- they changed the timing of their flowering and how much they flowered -- so they were really flexible in response to that difference in rainfall."

Because southern populations of California sagebrush don't count on the same rainfall patterns year after year, plants from this region could be used to bolster populations in the north, Pratt explained, helping to preserve this ecosystem as climate change progresses.

This finding is important not only to those looking to restore the coastal sage scrub ecosystem, but also to scientists modeling the future impacts of climate change, Pratt believes.

"Climate modelers often treat one species as having the same response everywhere it occurs," she said. "We're actually showing here that within one species, you can have very different responses that might affect its persistence in the future, so it's important to consider variation within an individual species when you're trying to model its response."

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