

Long-term cliff swallow study uncovers effects of climate change

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A 30-year study of cliff swallows, a long-distance migrant bird species, has revealed that global climate change is altering their breeding habits.

"When we began the project in 1982, we didn't intend to complete an analysis of [global climate change](#) effects or evolutionary effects," said Mary Bomberger Brown, research assistant professor in UNL's School of Natural Resources and coordinator of the Tern and Plover Conservation Partnership. "But since we collected data in a consistent, repeatable and reliable way for 30 years, we had data available to us that we could use to address these [global climate](#) change questions."

In a paper recently published in the journal *Ecology*, Bomberger Brown and co-author Charles R. Brown, professor of biological sciences at the University of Tulsa, detail the extent to which climate change has affected the breeding times of [cliff swallows](#).

For one, breeding time has become earlier—in some instances, it's up to two weeks early. This advancement in breeding time is best predicted by the severity of the drought in the breeding area.

"Breeding is initiated earlier in warmer, drier, drought years and breeding is more asynchronous in cooler, wetter, non-drought years," Bomberger Brown said. "There is no effect of climatic conditions in nonbreeding, wintering or migratory areas on breeding time."

Moreover, larger colonies are initiated earlier than smaller colonies. This

inverse relationship between breeding time and colony size is more pronounced in years with more severe drought.

"A number of climate change studies have looked at spring arrival time—when migrant birds first return in the spring—but that isn't strictly associated with breeding time," Bomberger Brown said. "It is confounded, so it isn't a reliable indicator of what is actually important to the species and to evolution. Using breeding time in these analyses lets us address whether global climate change is actually affecting the species in substantive selective or evolutionary ways, and then to consider what the broader consequences might be."

Bomberger Brown and Brown's long-term, ongoing research on cliff swallows is regarded as one of the most outstanding and complete studies of any avian species. The researchers have amassed a dataset containing information from more than 200,000 different individuals and more than 400,000 captures and recaptures.

For this particular study, they collected data on cliff swallows in southwestern Nebraska each summer from 1982-2012. Bomberger Brown, a fellow in the American Ornithologists' Union, said that cliff swallows are a durable, resilient and adaptable species.

"So far they've found ways to live with and accommodate the human race's intrusions into their environment," she said.

For instance, when nesting and flying around roads made them susceptible to being hit and killed by vehicles, they evolved shorter wings so they would be more acrobatic fliers and able to avoid cars.

"But global climate change seems to be pushing them in ways that they can't accommodate," Bomberger Brown said. "They are certainly trying, but there may be limits to what is possible, even for them."

While the study shines the spotlight on cliff swallows, Bomberger Brown said that the takeaways from this research transcend any one species.

"It is not necessarily a cliff swallow-specific study—they are just an example useful to examine a larger phenomenon," she said. "If such a capable species is beginning to be impacted by global [climate change](#), what does that say about the more vulnerable, more sensitive, less capable species? What does it say about humans? I think it's extraordinary that we can address important, timely questions—questions that seem to intrigue the world—using data collected right here in Nebraska."

Provided by University of Nebraska-Lincoln

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