

Examining the Effects of Climate on Animal Populations and Movement

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Ecological models projecting shifts in species distributions with climate change are starting to incorporate animal movement, but they assume that these movements will not be altered by climate change. Dr. Julia Earl, a postdoctoral researcher at Oklahoma State University, is testing this assumption by looking at the relationship between long distance movement characteristics and temperature. She is currently analyzing high resolution movement data from

GPS satellite transmitters for seven terrestrial vertebrate species across North America, including gray wolves, bison, white-tailed deer, and lesser prairies-chickens. Preliminary analyses indicate that animals display straighter movements when temperatures are warmer than normal. Temperature did not affect movement parameters more commonly included in species distribution models such as net displacement.

Julia has also been working on a project with Dr. Sam Fuhlendorf to perform a meta-analysis on the vital rates of lesser prairie-chickens in order to compare the predictive ability of temperature and precipitation means and extremes. The team used an information theoretic approach to rank predictive models for three vital rates: clutch size, next success and survival. First, they ranked a set of models focused on habitat, geography and individual characteristics and parameters. From these parameters, the best models were included in the generation of predictive models focused on climate variables. The team came up with six models based on climate variables: null, temperature averages, precipitation averages, temperature extremes and drought. For all three vital rates, a model based on climate variables was never the best predictor. Next success and clutch size were both influenced by nesting attempt with higher estimates for first nesting attempts than second nesting attempts. Clutch size also increased with latitude for first nesting attempts and decreased with latitude for second nesting attempts.

Julia and Sam's preliminary results show that individual characteristics and geographic variables are better than climate variables predicting variables such as clutch size, nest success and survival. This may be from the lack of precision in climate estimates relative to study site. Alternatively, relationships between climate variables and vital rates may be constrained by local adaptation and as such, may be better estimated by examining different regions separately rather than throughout the geographic distribution.

For further information about Julia and her research, check out her website:

[Dr. Julia Earl](#)