Higher temperatures likely to affect sharp-tailed grouse, study finds

February 13 2018, by Shawna Richter-Ryerson

Climate change is expected to reduce the nesting space of the sharp-tailed grouse, according to a recent study by researchers at Nebraska. Credit: E.J. Raynor | Agronomy and Horticulture

A study by University of Nebraska-Lincoln researchers has found that predicted increased temperatures across the Great Plains are likely to influence the survival of the sharp-tailed grouse, a native game bird species, by reducing nesting space.

"Our study carried out in the Sandhills rangeland of western Nebraska provides a baseline for understanding sharp-tailed grouse thermal ecology," said E.J. Raynor, postdoctoral research associate in agronomy and horticulture at Nebraska and lead author of the study. "Our findings suggest sharp-tailed grouse selected nest sites that reduced their exposure to high temperatures during the hottest part of the day."

Those nests experienced 88-degree or higher temperatures for at least an hour less than nearby available sites in the same pasture, Raynor said, noting that 88 degrees is the threshold where sharp-tailed grouse experience heat stress and pant to cool their bodies.

Past research found the birds preferred small shrubs and yucca plants as nesting locations. The study showed that availability of these fine-scale vegetative habitats within grasslands is important because they regulate nest temperature more than other vegetation in the study area.

For the study, Raynor and colleagues Larkin Powell, professor of ecology, and Walt Schacht, professor of agronomy, measured temperatures of grouse nests and nearby available spaces conducive for nesting in the Valentine area of the Nebraska Sandhills. They also documented vegetation characteristics of the sites. Temperature measurements were then compared to future projections of air temperature under different emission scenarios for the year 2080.

Researchers measured temperatures of grouse nests and nearby available spaces conducive for nesting in the Valentine area of the Nebraska Sandhills. They also documented the vegetation characteristics of the sites. Credit: Eric Schacht

Based on those projections, in 2080, grouse will face nest temperatures of 93 degrees or higher for five hours per day if greenhouse gas emissions are low and seven hours per day if they are high. Previous research in the southern Great Plains has shown that daily nest survival rates are reduced by about 10 percent for every half-hour the temperature remains above 93 degrees in the similarly sized lesser prairie chicken, Raynor said.

"Available locations on the Sandhills landscape would be over 93 degrees for six and nine hours of the day depending on future low- and high-emission scenario predictions," he said, "indicating thermal space not only at the nest will be more limited in the future."

The Nebraska Sandhills, where the grassland is intact, provides more appropriate nesting site options than other Great Plains grasslands, where higher grazing rates occur, and future climate conditions could further restrict the availability of nesting sites that meet the heat-stress temperature threshold. To survive, the sharp-tailed grouse's nesting behavior may need to change.

The researchers didn't notice a substantial difference in temperatures of nests that failed or hatched, indicating that predators may play a role in the grouse's nest fate. The researchers noted predation risk relative to thermal properties of nests was not thoroughly evaluated in the study and should be examined in future ones. They also called for further studies investigating the role of grassland temperatures and predators on nest placement and nest success.

"Our work shows that grouse have many options on where to place their nest," Raynor said, "but placing it in a cooler location can reduce the birds' exposure to temperatures that cause heat stress. This behavior will likely become even more important as temperatures climb under future climate predictions."

The study results were published Feb. 7 in the journal *PLOS One*.

More information: Edward J. Raynor et al. Present and future thermal environments available to Sharp-tailed Grouse in an intact grassland, *PLOS ONE* (2018). DOI: 10.1371/journal.pone.0191233

Provided by University of Nebraska-Lincoln

sharp-tailed-grouse.html