Analyzing Cortisol Levels of Ochotona princeps and Temperature Trends in the Great Basin Alpine Microclimate Habitats

Slaughter, Olivia (School: Salt Lake Center for Science Education)
Chien, Molly (School: Salt Lake Center for Science Education)

Pika (Ochotona princeps) are lagomorphs found on boulder taluses in alpine environments across the Mountain West. Pika have a notably high resting body temperature, making them highly susceptible to heat exposure and therefore a changing climate. This investigation analyzed temperature trends in the Great Basin, a habitat of pika, in search of causes of pika extirpation from 2011-2019. Temperature measurements (surface and talus) were collected at 4 separate locations in this region. The number of days above/below the acute temperature threshold of pika, cortisol concentrations, and length of gathering, transition, and snow insulation periods were compared between sites. While there were no distinct patterns in the number of extreme temperature days over time, there was a statistically significant difference between sites. The average cortisol concentration in pika scat samples collected at each site indicates short term stress. The data showed that the longer gathering period in 2019 at Bald Mountain correlated with higher pika stress levels when compared to 2015. However, there is not enough cortisol data to prove that the variables are linked. At the Cobblerest site, pika spend a smaller proportion of time in the snow insulation period than the gathering period in comparison to other sites and were extirpated for 4 years. To predict missing temperature data we used a mathematical model based on the relationship of surface and talus temperature data. This model was effective in predicting surface temperature data at the Cobblerest site using the talus temperature. Continuing to collect scat and temperature data at each site will provide a base in which temperature trends and pika survival can be analyzed over time and represent the dangers of a changing climate.

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