



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> Caelen G. McQuilkin	<b>Project Number</b> <b>J1219</b>
<b>Project Title</b> <b>Perfectly Pika: Extreme Temperature Moderation</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My project goal was to find out if the activity level of the pika, <i>Ochotona princeps</i>, is affected by temperature. Pikas are small mammals that live at high elevations in the mountains. My hypothesis was that pikas are more active during a median temperature range, so that they can avoid high temperatures which are very dangerous to pikas.</p> <p><b>Methods/Materials</b> Between September 14 and November 15 of 2014, I conducted weekly observations at an active pika site in Virginia Lakes in the Sierra Nevada mountains at 10,500 feet elevation. Pikas build haypiles (stashes of vegetation that they collect throughout the summer) in talus (slopes of broken rocks crumbling down from the peaks above). I observed pikas for an hour or more at three haypiles, using a homemade observation sheet to record 8 distinct types of pika behavior, such as haypiling and foraging. Also, to get additional pika data, I collaborated with another scientist and set up a motion-and-heat triggered camera at one of the haypiles. Simultaneously, I used 10 iButtons (thermometers) to continuously measure the temperatures pikas encounter in their habitat, such as the temperature on the haypile and in the foraging ground. Next, I calculated hourly rates for pika activity so that I could easily compare it to my hourly iButton temperatures.</p> <p><b>Results</b> I found that pikas are the most active during a median temperature range. For example, on September 21st, haypile 2 was 11°C and my observed hourly pika activity rate was 71. In contrast, when it is hot, pikas cannot be active, or they get hyperthermia and face possible death. Pikas quickly stop haypiling, foraging, and being active when the temperature rises above their preferred range. For example, on October 3rd, haypile 2 was 21°C, and my observed hourly activity rate was only 11. When it was very cold, pikas were not as active as they would be during a moderate temperature range.</p> <p><b>Conclusions/Discussion</b> My hypothesis, that pikas are more active during median temperatures, was correct. I connected my conclusion to the world by thinking about climate change. Since pikas are so sensitive to high temperatures, climate change will have a negative effect on them--pikas will be forced to spend less time haypiling and foraging and more time confined in the cool and safe talus matrix. With smaller haypiles, pikas will have less success surviving the winter.</p>	
<b>Summary Statement</b> After simultaneously observing pikas in the field and measuring the temperature, I found that pikas are the most active during a median temperature range, and least active when it's hot.	
<b>Help Received</b> Dr. Connie Millar helped me find an active pika site, eliminate uncontrolled variables, lent me the iButtons, and asked me helpful questions. Ken Hickman helped me gather additional data by setting up the camera at haypile 3. My dad helped me use Excel and my parents hiked with me to the pika site.	