



Pikas of Lava Beds National Monument

Project Summary and Results

Pikas in Peril Project Background

The American Pika (*Ochotona princeps*) is a charismatic indicator species of the potential effects of climate change on mountain ecosystems. Pikas are sensitive to summer heat and rely on winter snowpack for insulation from harsh winter temperatures. The National Park Service stewards pika populations in more than a dozen parks and seeks to understand the vulnerability of pikas and other mountain species to climate change. Pikas in Peril, funded in 2010, is a collaborative research program directed by scientists from the National Park Service, Oregon State University, University of Idaho, and University of Colorado-Boulder. To help the National Park Service better prepare for the ecological changes anticipated in the coming decades, the team pursued three objectives in eight of these parks.



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Objectives

1. Identify the factors (e.g., temperature, precipitation, habitat connectivity, topography, etc.) that shape contemporary pika distributions.
2. Assess the connectivity and gene flow of pika populations, including how landscape features affect movement of pikas between patches of suitable talus and lava flow habitat.
3. Evaluate climate change vulnerability of pika populations in each park by integrating pika distribution and gene flow models with forecasted regional changes in temperature and precipitation.

Results

Lava Beds National Monument (LBE) is unusually hot, dry, and low in elevation to support an American pika population. However, Pacific maritime influences make it warmer in winter than most of the other 8 parks included in Pikas in Peril research. This and the rather extensive lava flow habitats in the Monument (photo at right) make for a unique environment, which may help explain why the population is persisting. Like most other National Park units, the Monument is expected to get hotter in coming decades, but with little change in precipitation. Genetic diversity of the pika population in LBE is low relative to other studied parks (Figure 1). These factors contribute to increased potential vulnerability in the future.



NPS/ Tom Rodhouse

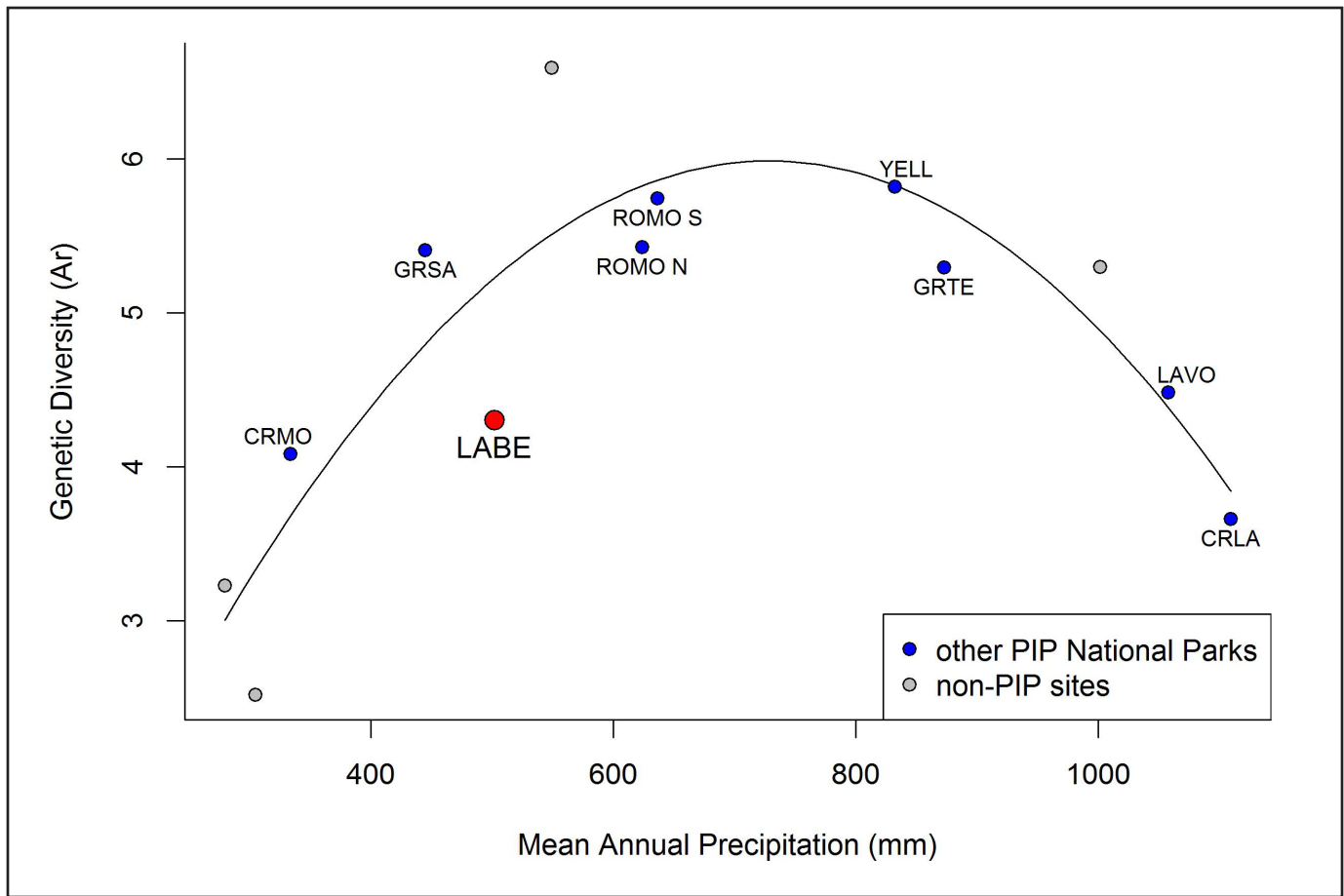


Figure 1. Genetic diversity, quantified as allelic richness corrected for sample size (A_r), was strongly predicted by mean annual precipitation. Study sites with moderate precipitation had higher genetic diversity than those with extremely high or low precipitation. LABE (red circle) had lower genetic diversity than most of the other Pikas in Peril sites (blue circles)

Conclusions

We found pika occupancy was higher at higher elevations and where summer temperatures were lower, leading to the expectation that future pika occupancy would decline with increasing summer temperatures. However, our models did not provide a clear picture of anticipated change for the LABE pika population in the coming decades. This uncertainty may result from the influence of subsurface lava flow microclimates.

Additional research on the lava flow microclimates at Craters of the Moon National Monument and Preserve suggests this is a highly influential aspect of the puzzle, but one that is very difficult to account for. In order to truly assess the climate change vulnerability of pikas at LABE, it may be necessary to record climate data at a finer scale, incorporating subsurface microclimates. Furthermore, other factors such as duration and depth of winter snowpack, also difficult to measure at high resolution across large landscapes, may ultimately be most informative for understanding climate change vulnerability of the LABE pika population. To that end, analysis of the past five years of pika site occupancy monitoring in relation to snow and other factors is underway.

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For more information, visit the UCBN pika monitoring webpages:

http://science.nature.nps.gov/im/units/ucbn/monitor/pikas_in_peril.cfm

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