



Pikas of Lassen Volcanic National Park

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.



NPS photo

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

Lassen Volcanic National Park (LAVO) is one of the warmer and wetter of the 8 studied parks, reflecting the maritime influence of the Pacific Ocean. The American pika population is well-distributed throughout the talus boulder fields (photo at right) and lava flows in the park. Current patterns of site occupancy show highest concentrations in the southeastern portion of the park and also north of Lassen Peak (Figure 1). Counterintuitively, relative to general expectations about pikas from previous studies, pika occupancy in LAVO does not show a strong association with elevation. Rather, the configuration and connectivity of habitat patches appear to be most important. Streams and lakes pose significant barriers to dispersal and gene flow.



NPS photo

Despite these limitations, our results suggest a relatively high degree of movement among habitat patches, and overall genetic diversity in LAVO is moderately high relative to other parks included in Pikas in Peril (Figure 2). In contrast to previous studies, we predict pikas will persist in LAVO under the climate scenarios we examined, perhaps because we incorporated park-scale habitat connectivity, gene flow information, and recent occupancy surveys.

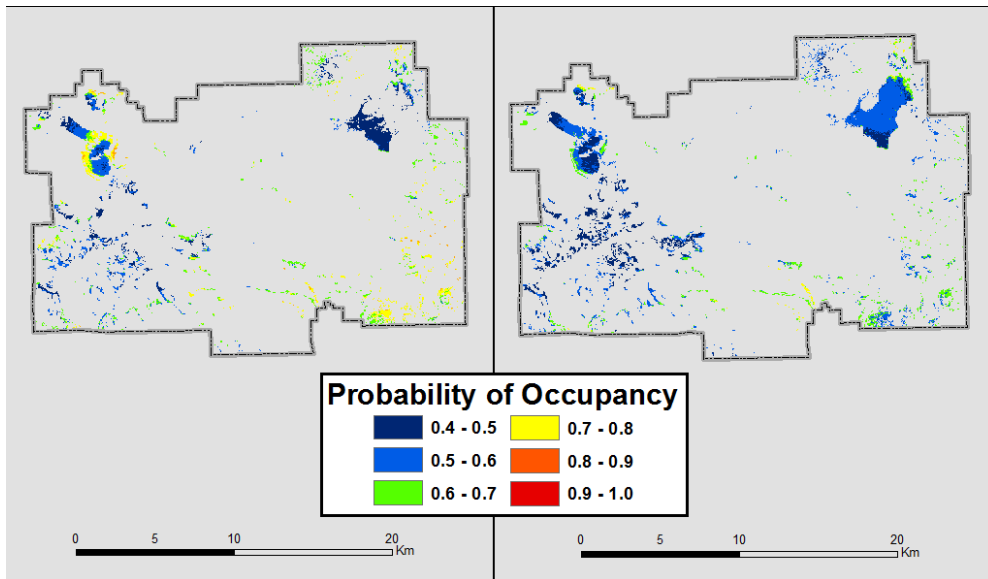


Figure 1. Map of LAVO showing current occupancy (left) and projected future occupancy (right) under a scenario of climate change with “business as usual” greenhouse gas emissions. Although the extent of potentially occupied habitat increases in this scenario, probabilities of patch occupancy decline. This is most notable in the southeastern and north-western portions of the park.

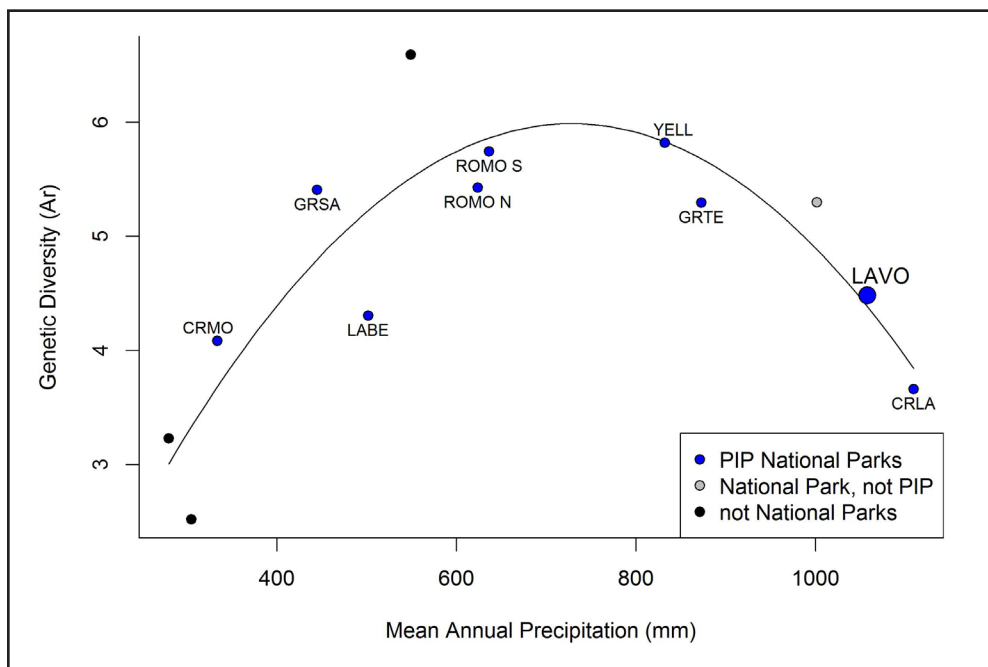


Figure 2. Genetic diversity, quantified as allelic richness corrected for sample size (A_r), was strongly predicted by mean annual precipitation. Study sites with moderate precipitation had higher genetic diversity than those with extremely high or low precipitation. LAVO had moderately high relative genetic diversity compared to the other Pikas in Peril parks.

Conclusions

Results from the Pikas in Peril study suggest that habitat connectivity will contribute to long-term persistence of the American pika population in the park (Figure 1). Although the park is predicted to get hotter in the coming decades, our models suggest that overall extent (distribution) of the population will increase to include nearly all potential habitat (talus and lava), perhaps because of increased potential for forage growth. However, because we anticipate an overall reduction in the likelihood of habitat patch occupancy within that distribution, continued monitoring will be important to guide park conservation efforts.

NPS Contact Information:

Tom Rodhouse, tom_rodhouse@nps.gov

For more information, visit the UCBN pika monitoring webpages:

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