



Resource Brief

Pikas in Peril

Multi-regional vulnerability assessment of a climate-sensitive sentinel species

Importance: Species vulnerable to climate change

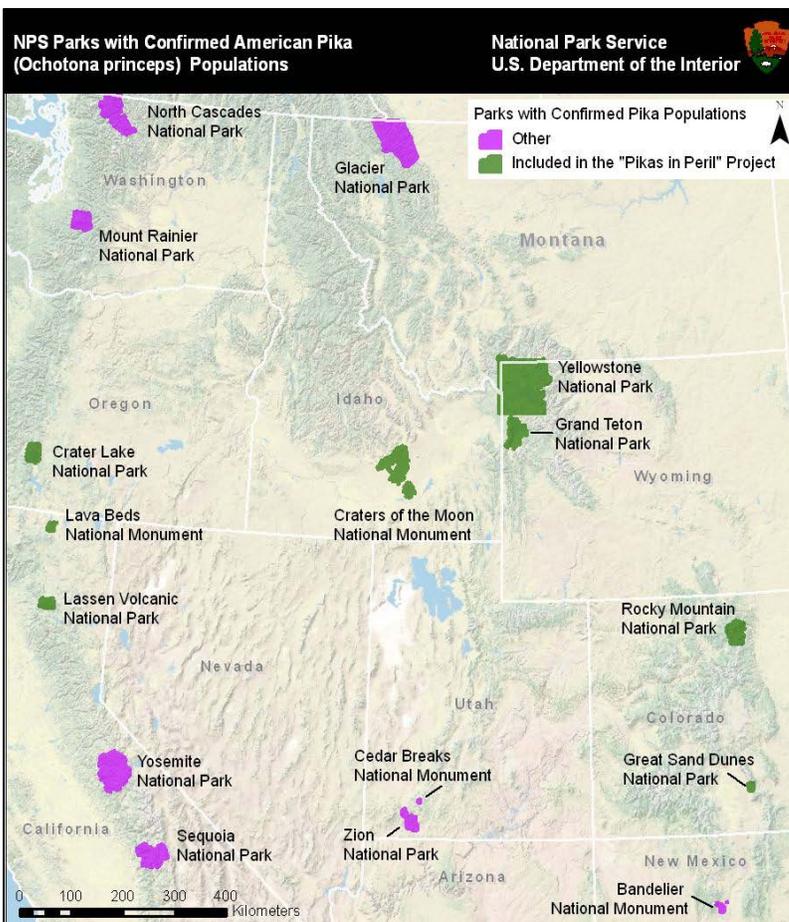
The American pika is considered an indicator species for detecting ecological effects of climate change. Results from recent studies suggest that in some areas pikas are being lost from lower elevations in response to increased warming, and thus, their suitable habitat is being reduced. In models designed to predict these patterns of loss, the importance of climatic factors has risen dramatically over the past decade. Recent habitat and extinction models predict that pikas may disappear from up to 80% of their current range by the turn of the century. Understanding the pika's vulnerability to climate change can provide important insights to park managers about potential impacts of climate change on park ecosystems. The National Park Service has a unique opportunity to assess the vulnerability of pikas to climate change by studying pika populations within the western U.S. parks. Sixteen western U.S. national park units have pika populations and eight of those units are included in this research effort (see map below).



American pika (*Ochotona princeps*)
Photo: John Apel, NPS

Parks involved in the project

- Crater Lake National Park, OR
- Craters of the Moon National Monument and Preserve, ID
- Grand Teton National Park, WY
- Great Sand Dunes National Park and Preserve, CO
- Lassen Volcanic National Park, CA
- Lava Beds National Monument, CA
- Rocky Mountain National Park, CO
- Yellowstone National Park, WY, MT, ID



Project background

This 3-year research project, funded through the National Park Service Climate Change Response Program, will address critical shortfalls in our understanding of pika ecology and vulnerability to climate change. A large team of academic researchers and National Park Service staff will work together to address questions regarding the vulnerability of the American pika to future climate change scenarios projected for the western United States. This team will also work with staff from the participating parks to develop information materials for the public and increase awareness.

Map of park units with confirmed pika populations and those involved in this project

Project objectives

1. Document pika occurrence patterns and predict pika distribution across the eight park units.
2. Measure gene flow and model connectivity of pika populations within five park units representing major genetic subdivisions and habitat types.
3. Project climate change effects on the future distribution, connectivity and vulnerability of pika populations in each park unit.

Methods and Project Status

The research team is collecting occupancy and habitat data at each of the parks, following a modified version of the peer-reviewed protocol developed by the NPS in 2009 for several parks in the western U.S. Focal data include variables that serve as proxies for stresses related to climate change (e.g., elevation). Occupancy of sites is determined by surveying for pikas, pika calls, fresh food caches, and fresh fecal pellets within plots with a 12-m radius, which represents an average territory size. Field crews are conducting these surveys at 80-100 sites per park July-October of 2010 and a similar number of sites, including 40-50 new sites, will be surveyed in 2011. Using information on genetic variation from analyses of fecal DNA collected during occupancy surveys and additional patch-based sampling, the team will quantify recent gene flow patterns and develop habitat-based models of population and subpopulation connectivity within parks. Finally, the team will combine models of distribution, habitat, population connectivity, and genetic diversity to assess the vulnerability of pikas to climate change in each park. Throughout the project, the team will develop and consistently update general and park-specific resource briefs, produce annual accomplishment reports, and work with interpretive staff on communication materials such as a powerpoint presentation and website content.



Above: A technician conducting a pika survey at Great Sand Dunes. Photo: Jon Harris
Below: A pika haypile and fresh scat. Photo: Michael Munts, NPS

Key references

- Beever, E.A., C. Ray, P.W. Mote, and J.L. Wilkening. 2010. Testing alternative models of climate-mediated extirpation. *Ecological Applications* 20:164-178.
- Craighead, A. 2008. Utilizing habitat suitability models to predict the effects of global climate change on three different species of pika (family Ochotonidae). Final Report to Alcoa Foundation.
- Loarie, S.R., C.B. Field, C. Ray, E.A. Beever, P.B. Duffy, K. Hayhoe, J.L. Wilkening and J.S. Clark. *In press*. Climate threats to the American pika: modeling historical persistence for 21st century projections. *Proceedings of the National Academy of Sciences*.
- Rodhouse, T.J., E.A. Beever, L.K. Garrett, K.M. Irvine, M.R. Jeffress, M. Munts, and C. Ray. 2010. Distribution of American pikas in a low-elevation lava landscape: conservation implications from the range periphery. *Journal of Mammalogy* 91:1287-1299.
- Ray, C., E. Beever, and S. Loarie. *In press*. Retreat of the American pika: up the mountain or into the void? In Brodie, J.F., E. Post, and D. Doak, editors. *Conserving wildlife populations in a changing climate*. University of Chicago Press, Chicago, IL.
- Shardlow, M.R., J. Apel, L.K. Garrett, G. Holm, D. Larson, N. Nordensten, and T.J. Rodhouse, 2009. Upper Columbia Basin Network American pika monitoring protocol: Narrative Version 1.0. Natural Resource Report NPS/UCBN/NRR—2009/XXX. National Park Service, Fort Collins, CO. *Draft*.

Contact Information

Mackenzie Jeffress, University of Idaho / Upper Columbia Basin I&M Network, jeffress@uidaho.edu
Mike Britten, Rocky Mountain I&M Network, Mike_Britten@nps.gov
Susan Wolff, Grand Teton National Park, Susan_Wolff@nps.gov