American Pika

American Pikas *(Ochotona princeps)* are charismatic inhabitants of the high mountainous areas of western North America, including Rocky Mountain National Park (RMNP). As cold adapted members of the rabbit family, pikas are highly sensitive to warm temperatures and must have access to cool microclimates. They are considered a warning species for the ecological effects of climate change. Therefore, there is increased interest in documenting changes in pika distribution and behavior (Wilkening and Ray, 2015). Although heat stress is a concern for long term survival of pika in the U.S., recent studies have suggested a decrease in snowpack as the greatest threat to pikas in RMNP, as a lack of snow cover reduces their insulation from extreme cold.

Background

The American Pika lives in alpine areas and is a prominent resident in RMNP. Prime pika habitat consists of rocky talus areas. They do not make burrows, but make nests in rocky slopes adjoining alpine meadows. Pikas may initiate two litters a year, but generally only one of these litters is successfully weaned. Pikas in RMNP are usually asocial and claim widely spaced, scent-marked territories. Pikas are active during the day but since they are cold adapted, they cannot tolerate heat. If temperatures exceed their tolerance levels, they confine their forage and food stock-piling activities to early morning and later afternoon. Typically, pikas' days are spent gathering food, guarding their territory, watching for predators, and sunning on rocks. Characteristic summer behavior involves repeated trips to alpine meadows adjoining their territory to harvest vegetation they will consume over the winter. Each pika stores their collected vegetation in hay piles under the talus. Pikas do not hibernate, so these farmers of the tundra need the long days of summer to ensure they store enough food to survive through the winter.

Management

RMNP is working with academic researchers to understand the distribution of pikas in the park, and to characterize pika stress levels through analysis of scat. Park pikas are monitored in collaboration with the Front Range Pika Project, a citizen-science effort coordinated by researchers at the Denver Zoo, Rocky Mountain Wild, and the University of Colorado-Boulder. Research findings highlight issues with habitat connectivity loss, but high genetic diversity, occupancy rates, and current distribution offer a bit of optimism that pikas may be resilient to climate change. In the future, management actions might include connecting habitat patches as climate change progresses. However, more data are needed to understand annual occupancy rates and to distinguish between short-term and long-term changes in pika populations.

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Photo courtesy of M Molloy, FRPP

Top: The American Pika is a small short-legged and virtually tailless egg-shaped mammal found in the mountains of the western US and Canada. Pikas are between six and eight inches long and weigh about six ounces. They communicate their presence by frequently uttering a short call (generally an "eenk" or "ehh-ehh"). Bottom: A citizen scientist collects scat samples while assisting with the pika habitat occupancy monitoring research in RMNP. Scat is analyzed for DNA and stress hormones.

Communicating to Our Public

Key Messages

- Climate change reflects a threat to alpine ecosystems, which threatens RMNP's pikas.
- RMNP staff are working with researchers to monitor pika populations and distributions to assess the influence of climactic changes on their communities.
- Due to climate warming, the available range for pika populations will likely decrease in coming years.

Desired Action from the Public

- Understand and appreciate American Pikas and the habitats they need for survival.
- Support climate change mitigation strategies to support the protection of alpine environments.
- Interested members of the local public can get involved in pika monitoring at RMNP through the Front Range Pika Project.

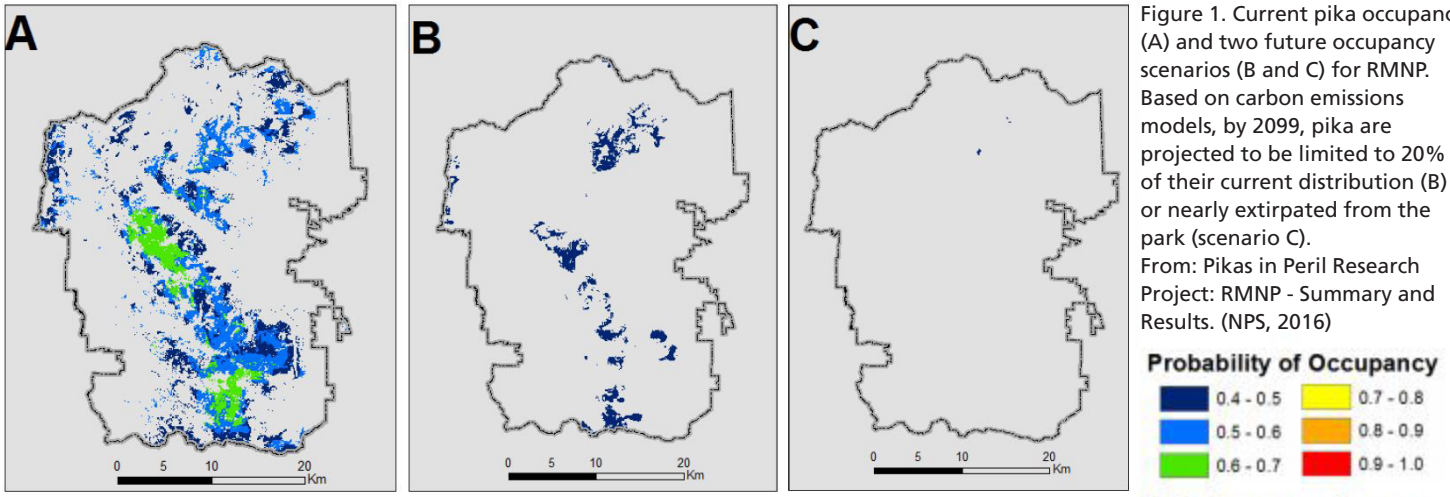


Figure 1. Current pika occupancy (A) and two future occupancy scenarios (B and C) for RMNP. Based on carbon emissions models, by 2099, pika are projected to be limited to 20% of their current distribution (B) or nearly extirpated from the park (scenario C). From: Pikas in Peril Research Project: RMNP - Summary and Results. (NPS, 2016)

Status, Trends, and Current Research

Pika research at RMNP began in 2008 and has focused on their survival in a changing climate. Several studies have examined RMNP in relation to other areas in the American West. A study by Erb, Ray, and Guralnick (2011) indicated that pika populations have remained relatively stable in RMNP. However, physiological sensitivity to warming, along with the increased warming at higher elevations on mountain ranges, have raised concern for the future resiliency of the American pika due to climate change (Millar and Westfall, 2010). The results of the studies across the West appear to be widely divergent based on locations and conditions (Jeffress et al., 2013; Schwalm et al., 2016).

Data about pikas in RMNP have emerged largely from one study, Pikas in Peril (PIP), which began in 2010 as a major collaborative research project to help the National Park Service better prepare for ecological changes in the coming years. Results from PIP indicate that by 2099, pikas may be confined to a handful of extremely small areas in the park (figure 1). Additional research by Schwalm et al. (2016) indicated that complete extirpation was predicted in RMNP under some climate model combinations. This study also suggested that consistent decline was the trend for future pika distributions in RMNP.

It is important to understand which environmental, climatic, and biological factors (e.g. temperature, precipitation, habitat connectivity, topography) shape pika population distributions. Different factors may be more important depending on location. For RMNP's pikas, vulnerability has been associated with insufficient snow cover that provides critical thermal protection from cold and supports habitat connectivity (Schwalm et al., 2016). In the southern Rockies, water might be the most important factor for long-term pika persistence (Erb et al., 2011). On a positive note, glaciers and underground ice features have been identified as potential refugia to pika in the Sierra Nevada (Millar and Westfall, 2010).

Genetic diversity indicates the potential for populations to respond to adverse conditions. Data from PIP indicated that RMNP had relatively higher genetic diversity compared to other areas in the West, which may mitigate potential population declines.

A citizen science pika monitoring protocol was developed in 2016 by researchers at University of Colorado-Boulder to extend data collection over the long term. Starting in 2017, citizen scientists trained in monitoring protocols survey selected plots for signs of pika and, if present, collect scat samples for genetic analysis and to screen for stress hormones (Beers et al., 2017).

In RMNP, factors related to cold stress and precipitation will be fundamental in explaining future occupancy patterns. The combination of higher temperatures, declining habitat suitability, and the resulting lack of connectivity between snow patches may lead to significant declines in pika populations in the future. Adequate vegetation and snowpack are dependent on seasonably appropriate moisture. However, research suggests that below average snowfall results in a lower snowpack that in turn produces cold stress in pikas in RMNP (Schwalm et al., 2016). Geographic variation in climate will likely determine how pikas in RMNP will fare, but clearly, the future remains uncertain.

Resources and References

Beers, A., C. Ray, and T.J. Rodhouse. 2017. Developing a Protocol for Long-term Population Monitoring and Habitat Projections to Track a Sentinel of Ecosystem Change in Rocky Mountain National Park. Final report.

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*These and other references can be found at: Q:_Library of Research and Science_ROMO\Research by Topic\Pika or in IRMA at https://irma.nps.gov/DataStore/Collection/Profile/4305