# Don't crawl under a rock: Look there for pikas!

## Engaging the public in climate-change science through surveys of a rock rabbit, the American pika

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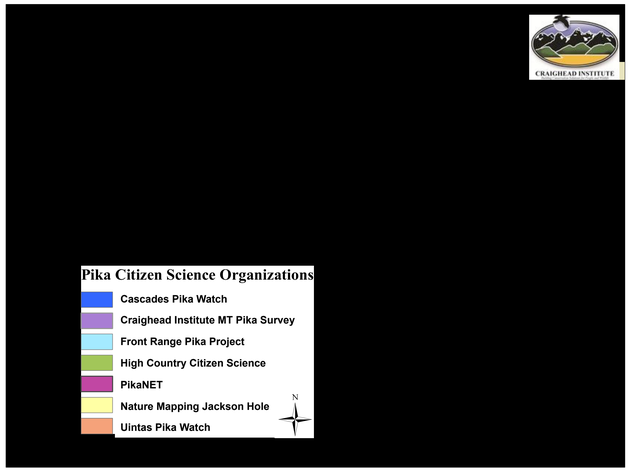
## Why American Pikas?

- Engaging people in climate change is a societal grand challenge, but recognizing local environmental changes is a promising approach [1].
- American pikas (*Ochotona princeps*) are an ideal subject for citizen science in the context of climate change because they are:
  - Easily accessible in popular recreation areas
  - Diurnal, locally abundant, and conspicuous in talus habitat (rockslides)
  - Charismatic and easy to identify by calls and large winter food caches
  - Sensitive to climate change and limited in dispersal ability [2]

*Most pikas store food for winter, making them easy and fun to observe.*

- Trained citizen scientists can be just as accurate as professionals at identifying occupied territories using pika sightings and calls. They also detect the same number of pikas per unit time [3].
- Peer-reviewed survey protocols have been adopted by several citizen-science groups conducting pika research [4].




## Current Pika Citizen Science Efforts

| Project | Administered by | Geographic region | Type of data Collected | Method of site selection | Volunteers | Sites | Training sessions |
|---|---|---|---|---|---|---|---|
| Cascades Pika Watch | Oregon Zoo and many collaborators | Cascade Range (OR, WA) | Presence and Absence | Opportunistic and Targeted | > 200 | 62 | 9 |
| Montana Pika Survey | Craighead Institute | Western MT | Presence only | Opportunistic | 55 | 309 | 15 |
| Front Range Pika Project | Denver Zoo, Rocky Mountain Wild, and science advisors | Front Range (CO) | Presence and Absence | Targeted | 308 | 46 | 17 |
| High Country Citizen Science | National Park Service | Glacier National Park | Presence and Absence | Opportunistic and Targeted | 877 | 47 | 84 |
| PikaNET | Mountain Studies Institute | San Juan Mountains (CO) | Presence and Absence | Opportunistic and Targeted | 181 | 36 | 14 |
| Nature Mapping Jackson Hole | Teton Science Schools and many collaborators | Western WY | Presence only | Opportunistic | 423 | 718 | 36 |
| Uintas Pika Watch | Salt Lake Center for Science Education, & science advisors | Uinta/Wasatch Ranges (UT) | Presence and Absence | Targeted | 130 | > 5 | 3 |

## Outcomes of Pika Citizen Science

- *Scientific outcomes:* Citizen-generated observations have opened new areas of research in atypical or lowland habitats.
  - Many of these observations are being used in a range-wide analysis to test how climate affects the species (Fig. 1).
  - Citizens have identified pikas in non-talus habitats or animals with unusual appearances (e.g., melanistic, albino)

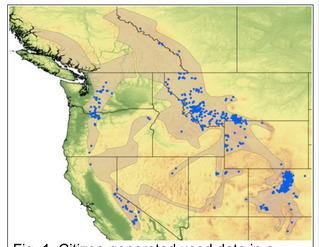


Fig. 1. Citizen-generated used data in a range-wide analysis (map courtesy of Adam Smith, Missouri Botanical Gardens)

- *Educational outcomes:* After participating in pika field trips, more 7th-grade students agree with the scientific consensus on climate change (Fig. 2). They also gained content knowledge and felt an increased sense of environmental stewardship *(J. Varner, unpubl. data)*.

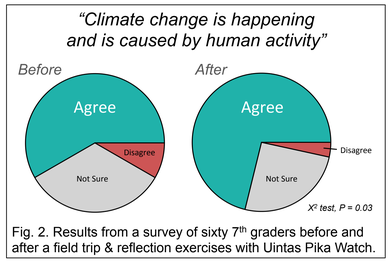



Fig. 2. Results from a survey of sixty 7th graders before and after a field trip & reflection exercises with Uintas Pika Watch.

- *Management outcomes:* Trend data generated by citizens can help support scientifically-based management decisions for pikas and other sensitive species, especially in understudied parts of their geographic range.

- *Inclusiveness:* With a variety of sites, participants can include a diversity of ages, knowledge, and fitness levels.

## Pika Research in the K-12 Classroom

- *Place-based education* uses the local environment to teach concepts and curriculum in a locally-relevant context. During formative K-12 years, observing local wildlife fosters strong personal connections with nature [5], especially for urban students who have fewer opportunities to experience the outdoors or develop conservation values.
- *Next Generation Science Standards* require essential scientific skills that can be addressed by participating in pika citizen science. These include:
  - Plan and carry out investigations
  - Gather and make sense of information
  - Analyze and interpret data
  - Construct and present arguments based on evidence
- ***Pika monitoring provides an opportunity for students to apply skills and knowledge to meaningful scientific problems, while also meeting educational standards and promoting conservation values.***

**EXAMPLE: Jane Goodall Environmental Middle School (JGEMS)**, a public charter school in Salem, OR helps partner agencies to track pikas after a recent fire.

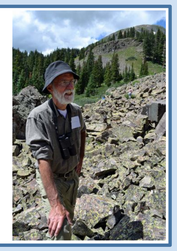
Students monitor pika abundance, vegetation and microclimates each August. Through citizen science, students are presented with authentic problems to solve in the field, which increase their knowledge, focus, and performance in the classroom.

## Lessons that Transcend Pikas

- PLAN for data management, volunteer coordination and appropriate technical training (e.g., for GPS and data entry platforms).
- PUBLICIZE opportunities via social media, which is a popular path of engagement for younger volunteers & enhances project visibility.
- MOTIVATE diverse volunteers by emphasizing many benefits of participation (e.g., visiting beautiful places vs. scientific contribution).
- MANAGE EXPECTATIONS by setting clear and realistic field protocols. Have sites that accommodate a variety of ability levels.
- BE REALISTIC: For some scientific questions, citizen science may not be the most appropriate method of data collection.

## Challenges & Areas for Future Attention

- Data compatibility: Online tools to standardize training, data collection and data entry would improve communication between projects. In larger analyses, multilevel models can account for remnant differences in data by group.
- Volunteer drop-out: Enthusiasm can be maintained by providing preliminary results (e.g., automated data summaries) that do not interfere with publication. After training, volunteers may also need a clear set of instructions leading to independent action.
- Resources: Outreach to citizen science projects could be explicitly included in the budget of scientific grant proposals.



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