American Pika

Ochotona princeps

REGULATORY STATUS

USFWS: Listing Denied
USFS R2: No special status
USFS R4: No special status
Wyoming BLM: No special status
State of Wyoming: Protected Animal

CONSERVATION RANKS

USFWS: No special status
WGFD: NSS2 (Ba), Tier II
WYNDD: G5, S2
Wyoming Contribution: HIGH
IUCN: Least Concern

STATUS AND RANK COMMENTS

American Pika (*Ochotona princeps*) was petitioned for listing under the Federal Endangered Species Act in 2007. In 2010 the U.S. Fish and Wildlife Service (USFWS) determined listing was not warranted, largely due to a paucity of range-wide information on the species and on how it might respond to climate change [1]. The species was again petitioned for listing in April of 2016, and the USFWS again determined that listing was not warranted (via a "not substantial" 90-day decision) in September 2016 [2]. American Pika is one of six species protected by Wyoming Statute §23-1-101. The Wyoming Natural Diversity Database recognizes the population in the Bighorn Mountains as deserving an independent conservation rank (S1; Very High Wyoming Contribution) due to its geographic isolation.

NATURAL HISTORY

Taxonomy:

Recent research on the molecular phylogenetics of *O. princeps* lead to a revision of the number of subspecies from 36 to 5 [3]. These 5 subspecies are now widely accepted and include the Northern Rocky Mountain Pika (*O. p. princeps*) that occurs in Wyoming. Each subspecies is associated with a mountain system in the Intermountain West and has probably undergone intermixing during periodic cycles of glaciation [4, 5].

Description:

American Pika is one of the most conspicuous and identifiable alpine species in the Rocky Mountains and can easily be distinguished in the field. Also known as "rock rabbits," pikas are most closely related to hares and resemble a tiny, short-eared rabbit. Adult size is consistent between sexes. Body mass is 150–175 g, and total length is 170–204 mm [6]. American Pika is very vocal, and individuals will give an alarm call to warn neighbors of nearby predators. To an untrained observer, pikas can be confused with marmots (*Marmota* spp.) that occupy similar habitat, but pikas are considerably smaller, and their nasal "eep, eep" vocalization is distinct

from the high-pitched whistle of a marmot. Unlike rabbits and hares, pikas have several distinct vocalizations, including a short alarm call and a longer song. Pikas in Wyoming exhibit a short call dialect that is notably different in duration and frequency from populations that extend south of the Colorado River [7].

Distribution & Range:
American Pika occupies the intermountain west with an elevational extent from 0 to > 4,000 m above sea level [8]. In the Great Basin, the lower elevational extent of American Pika distribution is moving upslope as a response to climate warming [9-11], and populations in areas with limited habitat, lower elevation of talus slopes, and populations nearer to roads have been extirpated [12]. However, newly documented pika populations suggest that populations may continue to persist in locations that are representative of the edges of climatic tolerances [13]. Mountain ranges along the western border of Wyoming are considered part of core pika habitat in the Central Rocky Mountain Range. The Bighorn Mountains host an insular patch of suitable habitat that supports abundant pika populations. The Snowy Range is at the very southern end of *O. p. princeps* range.

Habitat:
American Pika is considered a habitat specialist, requiring rocky habitats that provide thermal refugia interspersed with mesic meadows or patches of abundant forage. Patchily-distributed alpine talus fields are typical habitat for American Pika throughout its range. Anthropogenic substrate (e.g., mine tailings) and other natural formations (e.g., lava beds) are also habitat [14], as are downed logs and woody debris [15]. In Wyoming, pikas have been documented as low as 1,762 m [15], but most often they inhabit subalpine and alpine talus fields > 2,500 m. In order to maintain a balance between keeping cool during summer months and remaining active during winter months, habitat requirements and limitations vary throughout the geographic range depending on climate context [16]. At all latitudes, however, American Pika requires space within the rocky substrate to thermoregulate. At southern latitudes, refugia from heat may be particularly important. Individual pikas maintain territories of about 500 square meters [17, 18], but territories vary in size and shape depending on resource availability and pika density. Pikas actively defend territories from conspecifics to protect food caches.

Phenology:
Juveniles typically disperse ≤ 3 km, and populations separated by > 5 km are considered distinct [19]. Post dispersal, juveniles establish new territories. While they may relocate if an adjacent, higher quality territory becomes available, individuals will remain in the same talus patch for the duration of their lives [20]. Unlike most alpine mammals, American Pika neither migrates nor hibernates during winter, but remains active, usually under the snow, feeding on food caches known as "haypiles" harvested and assembled during the summer months. Females can have up to 2 litters per year but usually wean a single successful litter with an average of 3 offspring [14]. Timing and synchronicity of breeding and weaning varies annually and between individuals [21]. Females breed in early spring when snow cover is still present and again about 2 weeks after the first litter is born. Juveniles of a closely related species, Collared Pika (*O. collaris*), disperse about a month after parturition when emergence from the snow is feasible [22].

Diet:
American Pika is a generalist herbivore that feeds on a variety of vegetation. Pikas generally forage ≤ 100 m of their territories [23]. Because they build conspicuous haypiles during August and September, diet is identifiable. The content of winter caches generally resembles the surrounding plant community, although individuals often select plants that are high in nitrogen [24]. In

Wyoming, diet primarily consists of grasses, forbs, shrubs, and occasionally conifer twigs, moss, and lichen. Pikas are known to preferentially collect plant species with secondary compounds that have preservation qualities [25].

CONSERVATION CONCERNS

Abundance:
Continental: WIDESPPREAD BUT PATCHY
Wyoming: UNCOMMON
There are no abundance estimates for American Pika in Wyoming, although it is considered uncommon due to its restricted distribution. Pikas are known to occur in densities of < 10 individuals per ha [26]. In Wyoming, pikas are regularly found in patches of apparently suitable habitat and even in marginal habitat starting at about 2,000 m; they are found most reliably and consistently between 2,700–3,600 m. Pikas are locally abundant in places with ample forage and talus interstices.

Population Trends:
Historic: UNKNOWN
Recent: UNKNOWN
There are no published studies of American Pika population trends in Wyoming. One historical site in the Snowy Range was resurveyed in 2008, suggesting that pikas may have been extirpated from this site [27], although a subsequent 2009/2010 survey found some evidence of recent activity [28]. Pikas are still widely documented throughout the western and southern mountain ranges in the state as well as the Bighorn Mountains [29]. In western Wyoming pikas occurred at 58% of 146 surveyed locations [30]. At low elevation sites in the Great Basin, there have been population losses of 28% since the beginning of the 20th century [12] that are primarily linked to climatic extremes, including rising summer temperatures, exposure to cold during winter, and decrease in forb cover [9, 10]. A reevaluation of historical sites in the Southern Rocky Mountains found declines that were much less severe, with 6% of formerly occupied sites being extirpated [27]. The few extirpated sites were best explained by lack of availability of water at the site; extirpated sites were consistently dry over the last several decades. In other regions, including the Sierra Nevada and Cascade Ranges, populations are apparently stable [8, 18, 31].

Intrinsic Vulnerability:
HIGH VULNERABILITY
American Pika is highly vulnerable to habitat modifications due to its high specificity to isolated alpine and subalpine talus habitats. It is also susceptible to natural, local extirpations through metapopulation dynamics [32]. However, physiological requirements may be the most limiting factor. Because they remain active during winter, pikas maintain high metabolic rates, and their body temperature is consistently close to their upper critical temperature, which makes them vulnerable to heat stress [33, 34]. Low tolerance to heat can limit their ability to collect hay during the growing season if temperatures are close to their limiting threshold. Exposure to high summer temperatures also limits juvenile dispersal [14, 35].

Extrinsic Stressors:
MODERATELY STRESSED
Habitat alteration and loss driven by climate change is likely the biggest threat to American Pika range-wide. Climatic conditions, however, likely limit pika populations in context-dependent ways across latitudes [16]. Because summer temperatures are mild in Wyoming's more cool and

mesic alpine landscapes, increasing summer temperatures may not be as threatening as compared to populations in lower latitudes, unless there is local adaptation that could render Wyoming pikas relatively more sensitive than southern pikas to even moderate climatic changes. In the Wind River and Big Horn Mountain ranges, an index of pika abundance (scat density) increased linearly with elevation to a threshold of 3,600 and 3,300 m, respectively, beyond which abundance decreased, suggesting a ceiling effect [36]. The mechanisms of how climate limits American Pika in Wyoming remain unclear, although adequate snowpack and favorable growing conditions for forage during the summer might be important [27, 37]. Additionally, microrefugia provided by talus interstices may allow persistence in sites even with periodic extreme temperatures, albeit to an unknown extent [30]. Continued climate change will likely limit American Pika distribution indirectly by altering food availability, timing of daily activity, predation risk, and disease [10, 37].

KEY ACTIVITIES IN WYOMING

Ongoing efforts to monitor American Pika persistence in Wyoming began in 2009 when the Teton Science Schools initiated a pika project in the Gros Ventre and Teton Mountain ranges in northwestern Wyoming. This effort expanded into the Greater Yellowstone Ecosystem (GYE) Pika Initiative in 2010 [15, 38]. These studies use a widely accepted protocol primarily developed to monitor American Pika persistence over several years of survey [18, 39]. In collaboration with other non-governmental organizations, Nature Mapping Jackson Hole has developed a citizen science monitoring effort aimed at documenting American Pika observations made by volunteers throughout the GYE [15, 40]. Additional projects have evaluated the persistence of American Pika in portions of Wyoming's Snowy Range [27, 28], delineated limiting features of climate and habitat on American Pika populations in the Wind River and Bighorn Mountain ranges [36, 37], and quantified the relative importance of microrefugia to pika occurrence in the Gros Ventre, Salt, Wyoming, and Snake River Mountain ranges [30].

ECOLOGICAL INFORMATION NEEDS

Clear predictions about the responses of American Pika to climatic changes have been hampered by a lack of understanding of several key components, including the extent of local adaptation, the degree to which phenotypic plasticity may proximately buffer individuals during stressful periods, and the limits and trade-offs associated with such plasticity. There is also still debate regarding the lower temperature limits of American Pika, and an understanding of the ecology of pika in winter is lacking. Information on juvenile dispersal is similarly scarce. To date, the vast majority of American Pika research has focused on occupancy relationships. The fitness (e.g., fecundity, juvenile survival, adult survival) consequences of habitat selection and climatic variation need to be evaluated to assess habitat quality and risk of extirpation. Targeted study of preferred forage plants will also be important given the natural history of pika, their reliance on haypiles for winter forage, and climatic changes that may shift plant distributions.

MANAGEMENT IN WYOMING

This section authored solely by WGFD; Martin B. Grenier and Nichole L. Bjornlie. Recent management activities for American Pika have focused on funding research projects to improve understanding of habitat associations and potential impacts of climate change in Wyoming [36, 37], and on-going projects will continue to investigate these management questions. Moving forward, periodic surveys will be necessary in order to monitor site persistence and population trends.

CONTRIBUTORS

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Figure 1: American Pika. (Photo courtesy of John Whiteman)

Figure 2: North American range of *Ochotona princeps*. (Map from: Patterson, B. D., et al. (2007) Digital Distribution Maps of the Mammals of the Western Hemisphere, version 3.0, NatureServe, Arlington, Virginia.)

Figure 3: Talus fields intermixed with patchy alpine meadow at 10,900 ft in the Bighorn Mountains, Wyoming. (Photo courtesy of Leah H. Yandow)

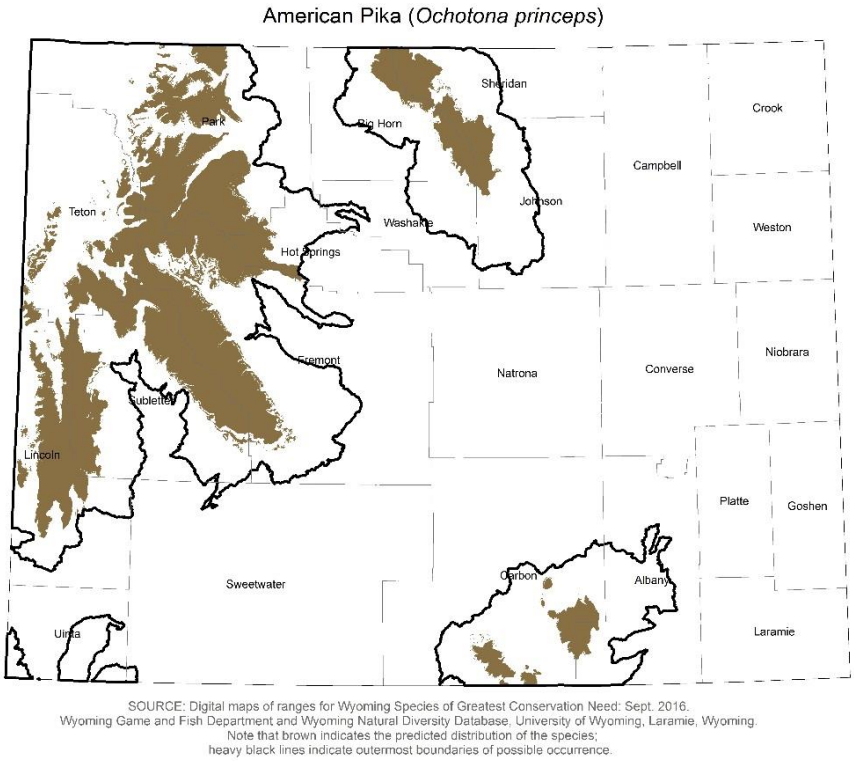

Figure 4: Range and predicted distribution of *Ochotona princeps* in Wyoming.

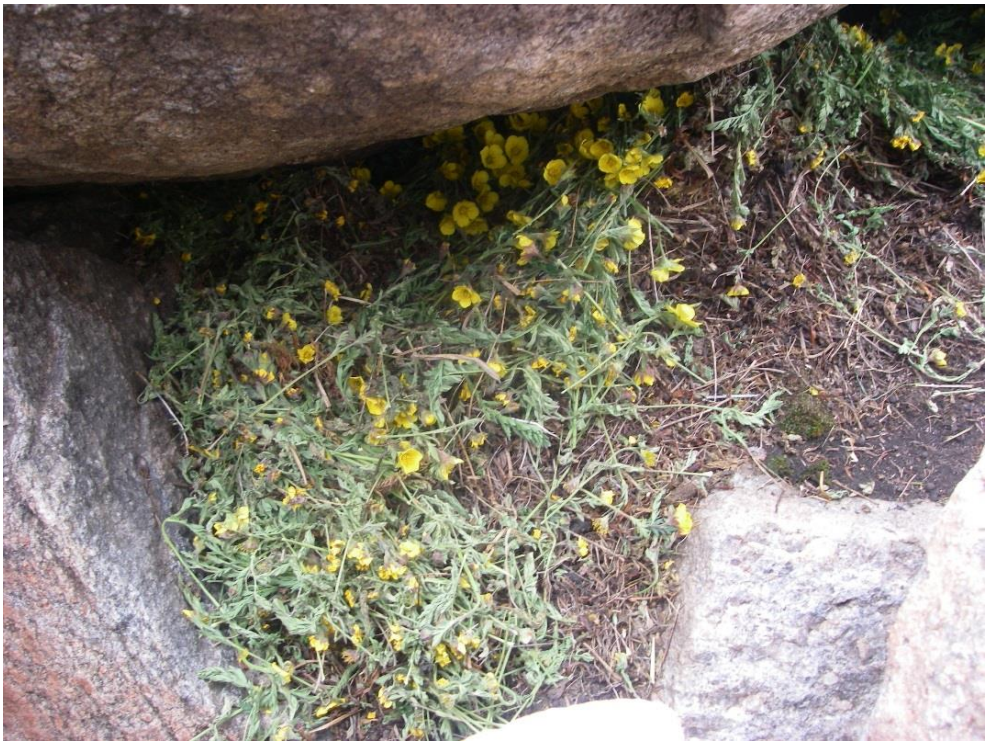

Figure 5: Pika haypile among rocks with old collected vegetation mixed with scat on the bottom, and fresh *G. rossii* clippings on the surface. This fresh sign is indicative of current occupied habitat. (Photo courtesy of Leah H. Yandow)