ABSTRACTS FROM 2010 PIKA CONFERENCE

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AMERICAN PIKA DISCOVERY SURVEYS IN NORTHWEST NEVADA

Bradley Bauman, Nevada Department of Wildlife, Winnemucca, NV*

Distribution of American Pika (*Ochotona princeps*) in Nevada is mostly known from historical records (50+ years old). Recent field research indicates that seven of 25 historically described populations of pika in the Great Basin appear to be extinct. These findings have added emphasis to earlier warnings that Great Basin pika populations, particularly those occurring at lower elevations, may be highly vulnerable to major disturbances such as global climate change. Understanding the dynamics of their current distribution is an important first step to helping conserve the species. Consequently the Nevada Department of Wildlife and USFWS initiated discovery surveys for American Pika in areas of suitable habitat in the Santa Rosa Mountains, and the Sheldon National Wildlife Refuge in northwest Nevada.

CONSERVATION PRIORITIES MODELS FOR THE AMERICAN PIKA IN THE WESTERN UNITED STATES

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The American pika is a montane species found among talus slopes throughout the western United States. Local extinctions and populations disappearing at lower elevations have been documented. Climate change is believed to be behind this phenomenon. Our objective was to model the future distribution of suitable pika habitat across the western U.S. under increased temperatures to identify which areas of the pikas geographic distribution are more negatively affected by climate change than others, thereby, providing managers a means of prioritizing conservation efforts over the entire U.S. We modeled the future distribution of suitable pika habitat using 1°C-7°C temperature increases, and compared the changes in predicted suitable habitat for subspecies of pika located in the U.S. Results indicate that certain subspecies may be more susceptible than others.

PRECIPITATION AS A DRIVER OF AMERICAN PIKA (*O. PRINCEPS*) DISTRIBUTION IN THE SOUTHERN ROCKY MOUNTAINS

Liesl Peterson Erb, University of Colorado, Boulder, CO*

Do the climate-driven patterns of pika population loss seen in the Great Basin extend to other portions of the species' range? Following a re-survey of 69 Southern Rocky Mountain sites historically occupied by pikas, data indicate that population extirpation has not been as severe in this region. Despite relatively few extirpations, low annual precipitation is implicated as a limiting factor for pika persistence. Sites consistently dry over the last century, regardless of climate change experienced in that period, are lacking current pika populations. While there is no climate change signal in these results, these data provide valuable insight into the potential future effects of climate change on *O. princeps* throughout its range. Future research will focus on climatic limitations on gene flow in this region.

UNDERSTANDING PRECIPITATION VARIABILITY IN THE UPPER SNAKE RIVER WATERSHED

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Recent drought and increasing demands on the water supply emphasize the need to account for climatic variability in all aspects of natural resource management. In particular, moisture variability can influence fire occurrence, habitat quality and wildlife distributions. Tree-rings provide a window into past precipitation regimes, yielding critical information on decadal and multi-decadal trends in water resources. We used tree-rings to reconstruct streamflows in the Upper Snake River Watershed (USRW) to better understand historic precipitation patterns in the region. We sampled Douglas fir (*Pseudotsuga menziesii*) and limber pine (*Pinus flexilis*) at 11 sites in the Greater Yellowstone Ecosystem (GYE). Tree cores and cross-sections from each site were used to develop a proxy for annual precipitation that spans 1587 - 2007 A.D. Our work indicates that long, dry periods are a natural part of the climate regime and that resource managers should expect longer, more severe droughts in the future. The USRW provides the headwaters for the Snake River, one of the most heavily used rivers in the West.

In August 2008 we initiated a collaborative pika (*Ochotona princeps*) monitoring project in Grand Teton and Yellowstone National Parks to better understand how climatic variability may influence wildlife. Because of their association with alpine communities and their vulnerability to warm temperatures, pikas may act as harbingers of change in montane environments. The results of this project provide much-needed data on pika habitat use and response to variable environmental conditions. This work will help resource managers better understand natural climatic variation in the GYE and will facilitate sustainable resource management that considers a range of possible conditions. The efficacy of future

wildlife management efforts largely depends on changing climate conditions and the underlying natural precipitation variability.

INVESTIGATING THE GENETIC BASIS OF ADAPTATION IN AMERICAN PIKAS

Philippe Henry, University of British Columbia-Okanagan, Kelowna, BC, Canada*

At the northern edge of its distribution, the American pika is distributed from sea level up to 2000 meters elevation in the Coast Mountains of British Columbia, Canada. This altitudinal gradient provides an ideal system to study adaptive population divergence, as environmental conditions change rapidly over short distances. I will explore the genetic basis of adaptation in pikas found across an altitudinal gradient using two approaches including: 1) direct sequencing of five targeted genes previously characterized in pikas and known to play a role in local adaptation to environmental conditions; and 2) AFLP-based genomic scans, allowing for genome-wide searches for loci under selection. This study will be among the first applications of population genomics within a climate change sensitive species.

FEDERAL STATUS REVIEW OF THE AMERICAN PIKA *(OCHOTONA PRINCEPS)*: FIRST ITERATION OF A CLIMATE CHANGE RISK ASSESSMENT

John Isanhart, U.S. Fish and Wildlife Service, West Valley City, UT*

The U.S. Fish and Wildlife Service recently performed a 12-month status review of the American pika to determine if listing under the Federal Endangered Species Act was warranted. The Service determined that climate change was the primary threat to the existence of the species and performed a deterministic risk assessment to determine if the species warranted protection under the Act. The risk assessment relied on a rapid-response climate assessment from the National Oceanic and Atmospheric Administration in combination with findings from field research studies and climate models. We review the assessment methodology, key findings, and data gaps and provide suggestions to improve the risk assessment process.

THE STATUS OF THE AMERICAN PIKA IN UTAH

Brian Maxfield, Utah Division of Wildlife Resources, Vernal, UT*

The American pika *(Ochotona princeps)* is an inhabitant of high-elevation talus slopes, and recent studies in California and Nevada have documented range contractions consistent with predicted responses to global warming. Pikas were known to inhabit many of the mountain ranges in Utah, but little data existed on current distribution and population trends. As such, an inventory and monitoring protocol was developed to document current populations and any changes into the future. A GIS model was created to define potential habitat based on elevation, landcover, and aspect. Occupancy surveys were conducted at 155 randomly selected locations with pikas detected at 84 sites. Statewide, estimated occupancy in suitable habitat was 0.75 (SE=0.04) and detection probability was 0.89 (SE=0.03). Models including meters above pika equivalent elevation, precipitation, and subspecies as occupancy covariates received the greatest support. However, it is unknown whether that represents the historical distribution of pikas or an early response to climate change. Further iterations of the monitoring scheme will document any changes in pika occupancy and be used to direct conservation actions.

EFFECTS OF TEMPERATURE ON AMERICAN PIKA ACTIVITY

Lucas Moyer-Horner, University of Wisconsin, Madison, WI*

American pikas have been identified as climate change sentinels because of their specialized niche and low thermal tolerance. We expect animals' first response to climate change will be behavioral adaptation. To measure how pikas behave in different thermal environments, we observed vocal and visual (above talus) activity at eight sites over eleven days in Glacier National Park, MT. Activity correlated negatively with mean above talus temperature at all sites except one. Pikas were more active overall at higher elevation sites. Advanced seasonality at high elevation sites may influence pikas to be more active earlier. Understanding pikas' behavioral adaptations to warm temperatures will allow us to identify mechanisms of site extirpations and anticipate future responses.

SIGNS OF DEMOGRAPHIC CHANGE AND PHYSIOLOGICAL STRESS IN ROCKY MOUNTAIN PIKAS

Chris Ray, University of Colorado, Boulder, CO*

Although there is little evidence for local extinction of pikas within the Rockies, long-term demographic data and recent data on physiology and microclimate suggest deleterious, climate-related dynamics in this region. A 21-year study in Montana and data from an LTER site in Colorado both demonstrate recent reductions in annual survival. During 2008-2009, survival and stress metrics were compared between these two sites. Survival was significantly lower and levels of stress-related plasma glucose were significantly higher at the Colorado site. In addition, survival on north-facing slopes in Colorado was significantly lower than on south-facing slopes. These patterns in survival and stress metrics may be explained by microclimate; temperatures were more extreme at the Colorado site, and were significantly colder on north-facing slopes within this site.

PARTNERING FOR PIKA: A STANDARDIZED PROTOCOL FOR MONITORING THE AMERICAN PIKA IN SEVERAL NATIONAL PARK UNITS

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Four National Park units, Crater Lake NP, Craters of the Moon NM&P, Lassen Volcanic NP, and Lava Beds NM, have formed a partnership with the Upper Columbia Basin Inventory and Monitoring Network to develop a long-term monitoring protocol for American pika. The protocol features an occupancy modeling-based approach to monitoring pika in which trends in percent of area occupied and local extinction and colonization rates are assessed. The methods allow for inclusion of key environmental predictor variables providing an ideal framework for testing hypotheses about drivers of pika population dynamics and for improving the precision of trend estimates. Pilot data from this effort has been used for predictive distribution modeling of pika in lava flows of Craters of the Moon.

BODIE PIKAS: WHAT THEY HAVE TO TELL US

Andrew T. Smith,[1] Lyle B. Nichols,[2] and John D. Nagy[3] (paper to be presented by Justine Smith[4])*
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We have investigated the American Pika *(Ochotona princeps*) at Bodie, California, since 1969, building on earlier studies in the late 1940's by Joye Harold Severaid. The Bodie pikas primarily inhabit ore dumps that are distributed across approximately 8 km^2. Patch size varies from relatively large "mainlands" to smaller patches which vary in their isolation (distance) from other patches. The pikas have, over time, occupied all available habitat, but at any time occupy only about 40% of available isolated patches. The Bodie pikas represent an active metapopulation with patch extinctions followed subsequently by spatially autocorrelated recolonizations. We will present a long-term, nearly annual, time-sequence of these dynamics from 1989 to the present. As of fall 2009, the northern constellation of patches was 84% occupied.

MODELING CONTEMPORARY RANGE RETRACTION IN GREAT BASIN PIKAS *(OCHOTONA PRINCEPS)* USING DATA ON MICROCLIMATE AND MICROHABITAT

Jennifer Wilkening, University of Colorado, Boulder, CO*
The American Pika *(Ochotona princeps)* inhabits talus slopes on isolated mountaintops in the Great Basin, where they are susceptible to localized extirpations. We re-surveyed 25 sites historically occupied by pikas, and collected extensive microclimatic data from each site. Results show that sites of pika extirpation experienced higher summer temperatures and higher frequency of extremely warm days, than did sites of persistence. Vegetation communities also differed between persistence and extirpation sites, and relative forb cover was positively related to pika persistence. Evaluation of competing models suggests strong support for recent mean summer temperature as the driver of extirpations in this dataset. In agreement with other modeling efforts, this result supports the hypothesis that extirpation results from chronic heat stress during the summer months when pikas must gather and store food for the winter.

PIKA MONITORING IN GRAND TETON NATIONAL PARK

Susan Wolff, Grand Teton National Park, Moose, WY*
Pikas are one of the few mammals that inhabit high elevation reaches of western national parks, yet in some areas little information is available about their distribution, habitat requirements, and other important aspects of their ecology. As global warming may have already adversely affected pika living in the parks, information about their population is clearly needed. In 2009, Grand Teton National Park, in cooperation with Teton Science Schools and Yellowstone National Park initiated surveys to evaluate pika occupancy, distribution, and habitat characteristics in the southern portion of the park. These surveys served as the first baseline study of pika use in the Teton Range. This presentation will discuss our methods, modeled after the Upper Columbia Basin Network's Pika Monitoring Protocol, as well as results from our first field season.

THE DISPERSAL HABITS AND MATING SYSTEM OF A COLLARED PIKA (*OCHOTONA COLLARIS*) POPULATION FROM THE SOUTHWEST YUKON

Jessie Zgurski, University of Alberta, Edmonton, AB, Canada*
The purpose of this study was to examine the dispersal and mating behavior of the collared pika (*Ochotona collaris*). Mark-recapture data suggests that collared pikas rarely disperse over 300 m from their natal dens. However, because there is likely pre-capture dispersal in our study population, we decided to examine their dispersal behavior using genetic methods. Pikas were captured at a study site in the Yukon from 1999 to 2008, and each pika caught was genotyped at fifteen microsatellite loci. The data revealed fine-scale genetic structuring in the population in most years, suggesting that most animals are surrounded by close kin. However, there was no evidence for extensive inbreeding. A parentage analysis revealed that pikas do not necessarily mate with their closest neighbors, which would serve to reduce inbreeding in the population.

NOT ALLOWED TO POST

NOAA RAPID-RESPONSE CLIMATE ASSESSMENT TO SUPPORT THE FWS STATUS REVIEW OF THE AMERICAN PIKA
Andrea J. Ray,[1] Joseph J. Barsugli,[2] Klaus Wolter,[2] and Jon Eischeid[2]*
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NOAA provided Fish and Wildlife Service with an assessment of climate observations and projections of change in pika habitat, as a climatological context for the status review. We provided western regional detail based on existing observations and projections and new findings from interpreting observations and the IPCC model projections at smaller spatial scales. A key finding of the report is the large spatial scale of recent and projected warming trends in the West. The 2050 summer temperature projections average about 3°C higher than recent climatology for most of the western U.S., and for 22 locations representative of pika habitats. Statistically downscaled temperature projections were used to relate these large-scale trends to habitat elevation bands. Finally, we gave an expert judgment on the "foreseeable future" for climate for the review.

EMERGENCE AND MAINTENANCE OF INFECTIOUS DISEASE IN SPATIALLY STRUCTURED PIKA POPULATIONS
Janet Foley, Katryna Fleer, and Patrick Foley, UC-Davis School of Veterinary Medicine, Davis, CA*
The pika inhabits mountains in spatially networked high altitude patches of talus slope. Most isolated patches containing pika would be below the critical community size needed to support disease agents. Connectivity among patches helps maintain pika populations, but also supports maintenance of disease. Sympatric small mammals and arthropods also provide a source for infectious threats to pika. We review theory of disease and connectivity and discuss how corridors can "rescue" disease from extinction in isolated patches or those not embedded in a larger community of small mammals. We discuss infectious threats to pika. We show that spatial and phenological complexity contribute to maintenance of disease enzootically. Ultimately, ongoing surveillance of the pika metacommunity will be essential in order to manage infectious threats to pika.

ALTITUDINAL STRATIFICATION OF SMALL MAMMAL PATHOGENS AND ECTOPARASITES IN YOSEMITE NATIONAL PARK
Katryna Fleer, Patrick Foley, and Janet Foley, UC-Davis School of Veterinary Medicine, Davis, CA*
The pika *(Ochotona princeps)* inhabits high elevation talus fields in the Sierra Nevada mountain range. Other small mammal species share this habitat creating a potential for transmission of disease agents pathogens among species. Additionally, due to climate change, some species are changing their ranges, and may increasingly overlap with pikas. We surveyed ticks, fleas, and pathogens in currently and potentially sympatric small mammals across altitudes in Yosemite National Park. Individuals were seropositive for Anaplasma phagocytophilum, Rickettsia rickettsii, and Borrelia burgdorferi. We identified 16 species of fleas and 10 species of ticks, including vectors for plague and tularemia. Fleas in particular showed distinct preferences for particular altitudes. These data provide a baseline for future studies on the health of this potentially vulnerable species.

POSTERS (alphabetical by first author)

FACTORS AFFECTING PIKA POPULATIONS IN THE NORTH CASCADES NATIONAL PARK SERVICE COMPLEX
*Jason Bruggeman[1] and Roger Christophersen[2]**
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[2] National Park Service, North Cascades National Park Service Complex, *Sedro Woolley, WA*
The goal of this work was to address information needs about American pika *(Ochotona princeps)* populations in the North Cascades National Park Service Complex in Washington. We gathered data from late June through September 2009 on pika abundance, habitat attributes, and temperature in 115 talus patches contained within 30 1 km^2 survey areas. We found active pika presence in 90% of survey areas and 74% of patches, which ranged in elevation from 351 to 2130 m. We used statistical modeling techniques to examine climate, habitat, and anthropogenic factors influencing large- and small-scale variation in pika abundance. On large scales, abundance was positively correlated with elevation and total patch perimeter. On small patch scales, temperatures at and below the talus surface, and patch perimeter influenced abundance.

UTILIZING HABITAT SUITABILITY MODELS TO PREDICT THE EFFECTS OF GLOBAL CLIMATE CHANGE ON THREE DIFFERENT SPECIES OF PIKA (FAMILY OCHOTONIDAE)
April Craighead, Craighead Environmental Research Institute, Bozeman, MT*

Climate change and its effects on all species may be one of the most difficult challenges to be faced in the twenty-first century. One species that is threatened by climate change is the pika (Family Ochotonidae). We developed habitat suitability models for three different species of pika: Alpine pika (*Ochotona alpine)*, Ili pika (*O. illensis)* and the American pika *(O. princeps),* to determine current habitat and changes in habitat under a 3°C warming scenario. Modeling results were mixed for two species of pikas due to the lack of pertinent GIS layers. Results for the American pika model indicated that an increase in temperature due to climate change will have a significant impact on pikas in the future.

SURVEYS AND TEMPERATURE PROFILING OF HISTORIC AND CURRENT PIKA SITES IN THE LASSEN PEAK REGION

Cody Massing and John Perrine, California Polytechnic State University, San Luis Obispo, CA*

American pika populations may be declining due to rising global temperatures. To better understand pika persistence, we resurveyed 17 historic pika sites in the Lassen Peak region of northern California. Ten of the historic sites were currently occupied, as well as an additional 7 of 12 new sites surveyed. At each site we collected habitat information, and are currently analyzing the data for factors that are correlated with site occupancy. We also installed 38 iButton thermal dataloggers in abandoned and occupied pika use sites, to determine if temperature affects occupancy. These probes will be retrieved in summer, 2010. Research on the American pika's persistence and habitat requirements is imperative for understanding the effects of climate change on pikas, and to establish a baseline for future monitoring.

PIKA CITIZEN SCIENCE IN THE SOUTHERN ROCKIES

Megan Mueller[1], Chris Ray[2] and Greg Newman[3]*
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Affiliated organizations not listed above: Mountain Studies Institute, Durango, CO and Denver Zoo, Denver, CO

In the Southern Rocky Mountains, several researchers and organizations are collaborating to launch a citizen science effort to gather baseline data on the current distribution of pikas and pika habitat, as well as data on the phenology of snowmelt, growing season, and pika haying activity. This is the first phase of a long-term monitoring effort, and involves the development of PikaNet, a web-based database for interactive data mapping and dissemination of tools for further development of citizen research on the pika. The project will provide data to help researchers and managers understand factors that may influence pika distribution over time. This poster outlines the research questions, protocols and citizen science database under development for this project.

PIKA HABITAT OCCUPANCY ALONG THE I-90 CORRIDOR IN THE WASHINGTON CASCADE RANGE

Raychel Parks, Central Washington University, Ellensburg, WA*

We are surveying pika habitat and monitoring pikas near Interstate 90 in the central Washington Cascades. Our objectives are to collect baseline data on pika distribution and population genetics before wildlife crossing structures (bridges and underpasses) are constructed to increase wildlife connectivity across the interstate. We have mapped pika habitat (talus slopes and rock fill/rock piles) along a 15-mile stretch of the interstate, in a band extending ~ 2 miles from each side of the interstate. In 2008, 95% of 40 sites surveyed were occupied by pikas. In 2009, 88% of 52 sites were occupied. Occupied sites include human-made rock habitats (road fill) directly adjacent to the interstate shoulders and rip-rap under interstate bridges. We are also surveying the different types of pika habitat including talus, road fill and rip-rap to determine what the habitat feature requirements are for pikas such as rock and patch size.

DELINEATING CRITICAL HABITAT ELEMENTS FOR AMERICAN PIKAS IN THE FACE OF CLIMATE CHANGE

Leah Yandow, University of Wyoming, WY Cooperative Fish and Wildlife Research Unit, Laramie, WY*

The American pika (*Ochotona princeps)* is particularly vulnerable to climate change due to its unique life history, physiological constraints, and limited dispersal ability. Range shifts and declines of pikas at low elevation and historic sites are linked to rising summer temperatures in parts of its range. However, clear evidence for, or mechanisms causing declines in the Northern Rocky Mountains are not yet evident. I am initiating research on pika subpopulations in the Wind River Range of Wyoming that will focus on quantifying the importance of a variety of climate variables and habitat characteristics on pika presence and densities. Results from this work will allow predictions of shifting pika populations with climate change.