

## Potential impacts from introduced mountain goats on La Sal Mountain alpine arthropod communities: establishing baseline conditions

In August 2013, the Utah Division of Wildlife Resources introduced 20 mountain goats (*Oreamnos americanus*) onto the La Sal Mountains, a small mountain range in southeastern Utah. An additional 15 of these non-native goats were placed in August 2014. The mountain goat is not native to the La Sal Mountains; biota of the La Sals evolved without the pressures of mountain goats for at least 10,000-15,000 years<sup>17</sup>.



Introduction of these non-native animals into the La Sals represents a threat to sensitive resources in alpine and subalpine ecosystems of this isolated mountain mass, including endemic plant species in La Sal alpine habitats, soil biotic communities and stability, and perhaps invertebrate species. To accurately assess whether mountain goats impact La Sal environments, it is critical that baseline conditions of the alpine

ecosystems and communities be established. Ideally, these measurements would occur prior to mountain goat introduction but that opportunity has been lost; the best that can be done is to gather data while the goat population is small and impacts are limited in scope.

My research, funded in part by the American Alpine Club for 2015, involves sampling the alpine arthropod biota of the La Sals to establish baseline conditions as early as possible in the tenure of mountain goats



on the La Sals. This work is necessary because almost nothing is known about the alpine arthropod fauna of the La Sals, and without surveys to determine which species are present, and some assessment of abundance and habitat use, it will be essentially impossible to determine, in the future, whether mountain goats have affected arthropod communities or not. I conducted pitfall sampling in 2014 on a volunteer basis, with some supplies provided by the Manti-La Sal National Forest; funding from the American Alpine Club and continued National Forest support allowed me to continue in



2015. Additional fieldwork was funded for 2016 by the Canyonlands Natural History Association. I currently have 3 years of pitfall data, limited pollinator data from 2015, and more extensive pollinator data from 2016. Unfortunately, most of my data still consist of many-legged critters in vials, waiting to be sorted, classified and counted. Thus, at this time I do not have any preliminary results to report.



Fieldwork in 2015 consisted of conducting sweep surveys for pollinators and setting up transects of pitfall traps in each of 2-3 habitats at 3 sites in La Sal



alpine environments, leaving them open for about 30 days, then collecting them and cleaning and sorting the contents. The pitfall trap used in this study consisted of a pvc pipe sleeve (3 cm inside diameter) placed in the ground, with a glass test tube (2.9 cm outside diameter) inserted in the pvc pipe. The test tube is filled about halfway with food grade propylene glycol, which acts to drown and preserve any organisms falling into the tube. The tubes are collected at the end of the sampling period, cleaned of debris and the organisms sorted by order, family and, when possible genus and species. In most cases, it is not possible to get

specimens identified to their actual genus and species without having them examined by experts, which can be

expensive and sometimes very difficult as for some taxa there are few experts still alive. In these cases, specimens are assigned morphospecies names based on my coarse determination of differences in their appearance (e.g., morphology).

The alpine arthropod communities of the La Sals are very poorly known. A search of the Symbiota Collections of Arthropods Network (SCAN) of 45 museum databases<sup>35</sup> indicated fewer than 60 records of only seven taxa recorded from above 3200 m in the La Sals. The data indicate opportunistic sampling or targeted efforts at individual taxa (e.g., grasshoppers), with no effort to describe arthropod community structure in these ecosystems apparent. My work in 2014 and 2015, along with the proposed 2016 field season will be the first effort at describing alpine arthropod communities from the La Sals and represent one of very few such studies on isolated sky island mountain ranges in North America, providing a significant addition to our understanding of alpine ecosystems.

Specimens from only one sample have been characterized to morphospecies level; 51 different morpho-taxa were recognized from this one



sample. The alpine ground-dwelling arthropod community appears to be quite diverse and has definitely not been adequately sampled in the past. One bumblebee caught in a pitfall trap in 2014 and identified by Xerces Society personnel as *Bombus balteatus*, which is a high latitude-high elevation species. A search of SCAN found only one previous record of *B. balteatus* in Utah, on Leidy Peak in the Uinta Mountains in 1964. We don't know if *B. balteatus* is common or rare but it is

certainly poorly documented; just one example of our ignorance of La Sal alpine arthropod communities.

This work initiates one of very few (if any) studies that directly examine how mountain goats may affect species other than plants or other ungulates, significantly adding to our understanding of how introducing a non-native ungulate to a sensitive and fragile ecosystem may affect that system. Establishing baseline alpine arthropod community composition and structure also establishes the basis for future assessments of changes that may be associated with changes in climate. Thus, the value of the proposed study extends beyond just evaluating the potential impact of introduced mountain goats in the La Sals.



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