Wind and Wildlife:

Comparing Windscreen Effectiveness in High Alpine Weather During Pika Audio Collection

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Introduction:

The American pika (*Ochotona princeps*) is a small, temperature sensitive lagomorph whose iconic squeal can be heard throughout high alpine regions like the Rocky Mountains. Its distinct short calls and windy habitat make the pika a prime candidate for the testing of different audio tracking devices and setups. This study aims to quantify how the various types of wind protection available for acoustic recording devices affect the quality of audio collection. Understanding these factors will lead to better audio tracking and mapping methods for species similar going forward.

METHODOLOGY:

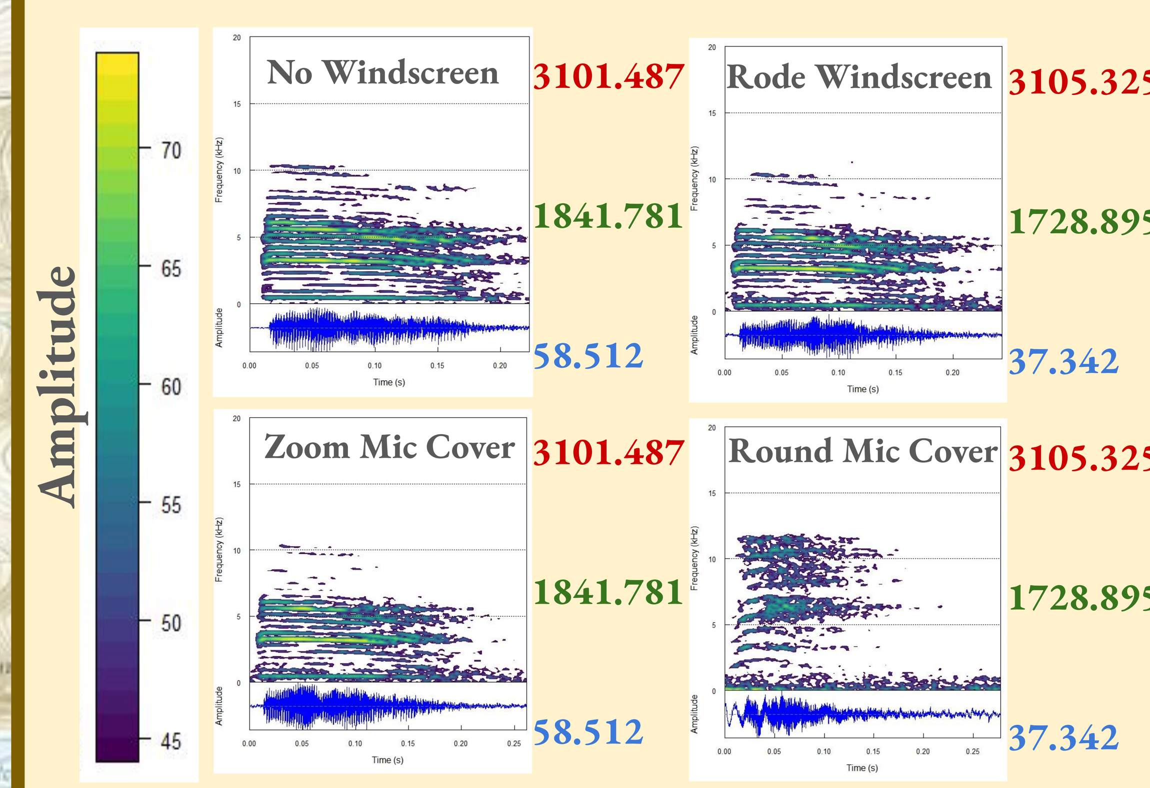
Controlled Sampling and Analysis: Using pre-recorded American pika short calls played from distance of one meter away, we tested how well different wind screens were able to mask simulated windy mountain conditions. Each windscreen underwent ten trials, and the results were analyzed by comparing the mean of the frequency, standard deviation, and standard error.

Sampling Sampling- Shotgun Mic: Pika calls were recorded in the field using a Zoom M3 shotgun microphone with three different types of windscreens or no windscreen. Five calls using each setup were randomly selected from these recordings. The distance between the microphone and the squeaking pika, as well as the wind speeds varied just like they would when using stationary means of audio collection. The mean of the frequency, standard deviation and standard error of all forty clips were then collected and analyzed.

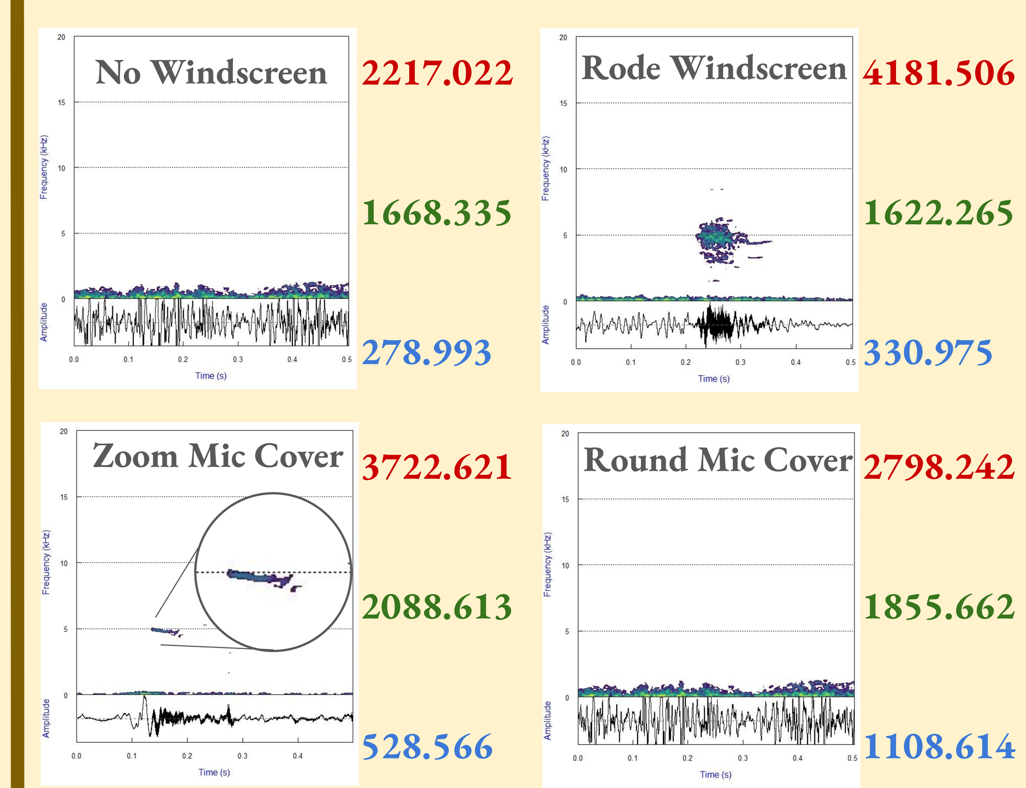
Field Sampling-SolarBAR: SolarBAR's are stationary acoustic recording devices that have been used on Niwot Ridge for the last two field seasons. During a three-day period SolarBARs located at two different locations on the ridge were outfitted with two types of windscreen to see if they affected the quality and quantity of the audio collected.

RESULTS:

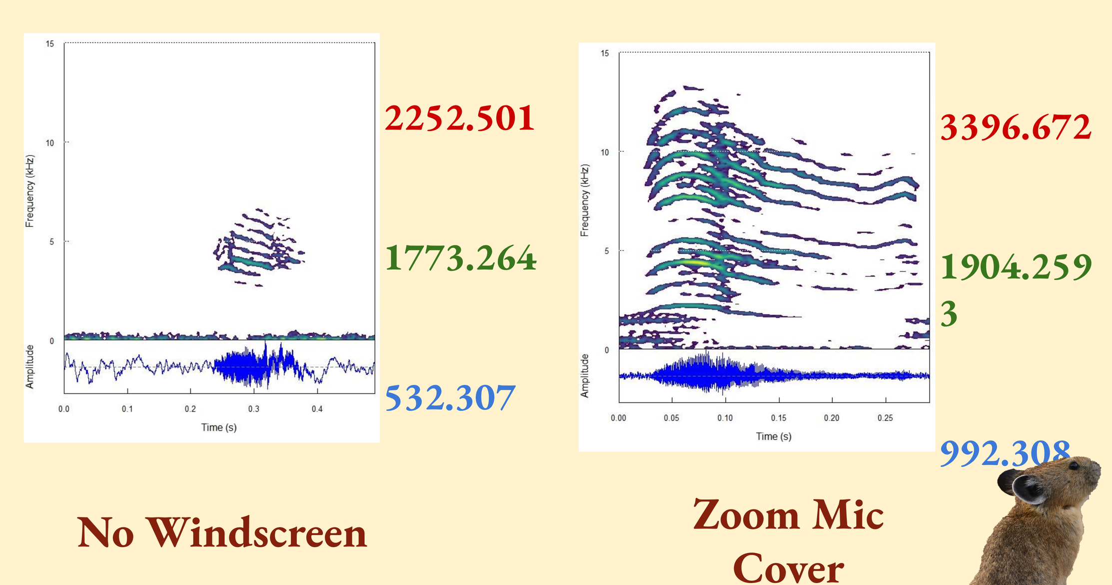
Controlled Sampling:

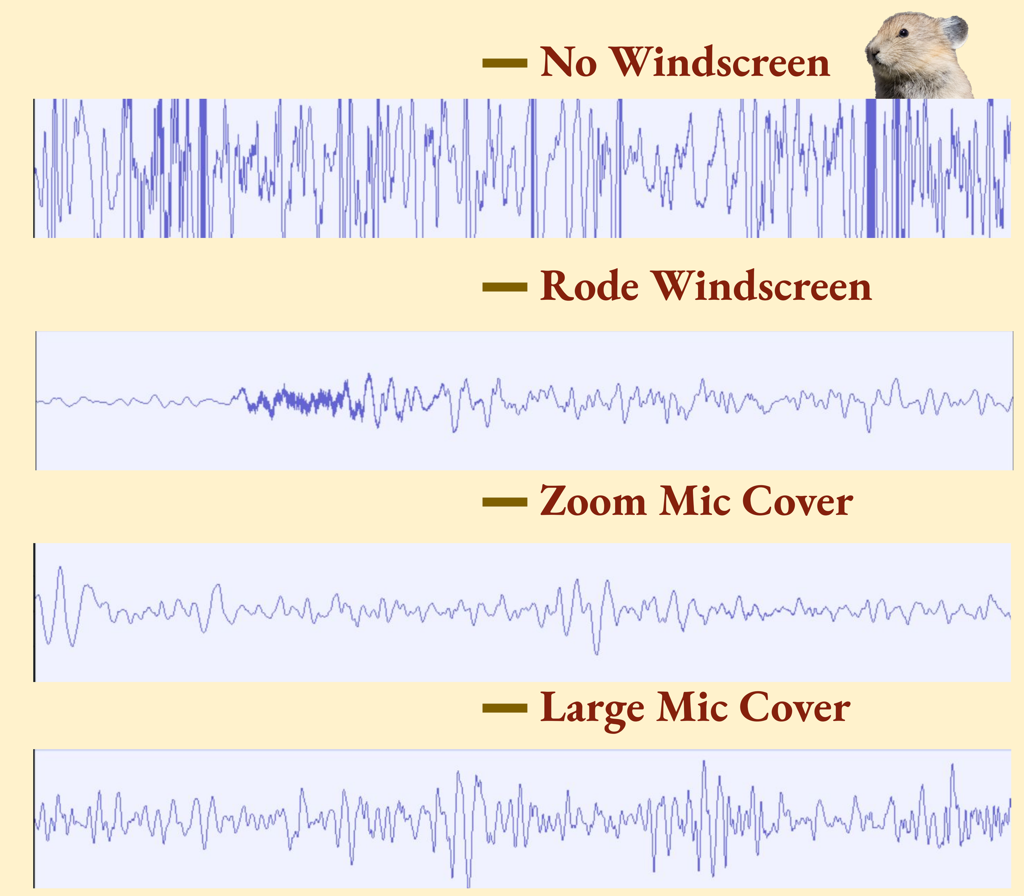


Field Sampling:

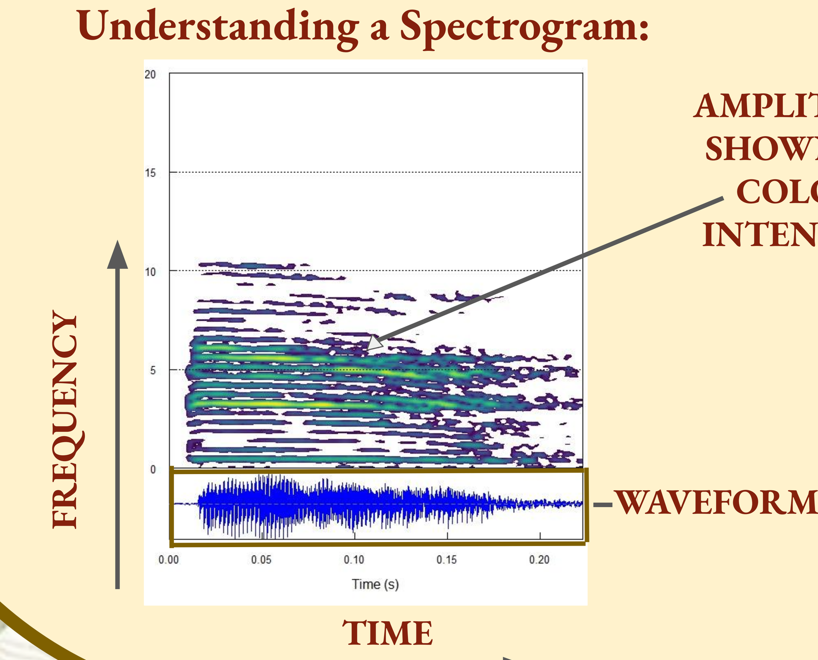


SolarBAR Sampling:





Understanding a Spectrogram:



SolarBAR:

Shotgun Mic Variations:

KEY:

Mean of the Frequency

Standard Deviation

Standard Error

Discussion:

Controlled Sampling:

In the controlled sampling portion of the experiment, there was minimal deviation in performance with or without the use of windscreens. The large mic cover's spectrograms were notably more distorted than the others, though the cause is unclear. While the RODE windscreen exhibited the smallest standard deviation and percent error, the differences were not significant enough to draw firm conclusions. Pika calls appeared most clearly on spectrograms at a mean frequency of approximately 3100 Hz.

Field Sampling - Shotgun Mic:

In the second phase of the experiment, there was considerable variation in mean frequency, standard deviation, and standard error. Difference from previous phases mean frequency: No Windscreen:+884.465, RODE Windscreen:-1076.181 ZOOM Mic Cover:____.____ Large Mic Cover:___.___. The RODE windscreen and Zoom mic cover were the only ones capturing sufficient amplitude to display on a spectrogram. In clearer audio clips, the calls appeared as bolder sections of the waveform. This time, the RODE windscreen had the smallest standard deviation but also a significantly higher mean frequency. The sample size of five calls and varied distance and weather conditions limited our ability to draw any definitive conclusions. More testing is needed to backup current data.

Field Sampling - SolarBAR:

Part three demonstrated an improvement in audio collection performance, with the Zoom mic cover achieving a mean frequency closer to 3100 Hz. Interestingly, the Zoom windscreen also had a higher standard deviation and standard error. Difference from Phase One results in mean frequency: No Windscreen:-848.989, ZOOM Mic Cover:-291.347. Difference in Standard Deviation:No Windscreen:+68.517, Zoom Mic Cover:___.___

Conclusion and Future Work

Tentatively speaking there does seem to be a correlation between using windscreens and clearer call sampling. Currently, the sample size is too small to make any definitive conclusions. Moving forward, I plan on increasing the sample size to thirty SolarBAR samples while also including an additional site and windscreen in order to ascertain more reliable results.

Acknowledgements:

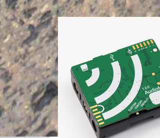
Niwot Ridge LTER
UNIVERSITY OF COLORADO BOULDER

RECCS

NSF Award # 2224439

NSF Award # 1757930

CIRES · Mountain Research Station · INSTAAR · NSF



AudioMoth (no case)

AudioMoth on Talus

AudioMoth Recorder