Variation in the Echolocation Behavior of Western Long-eared Bats (Myotis evotis) in Open and Closed Habitats

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Introduction

- Bats are significantly influenced by environmental changes in habitat structure and echolocation calls can vary based on these changes.
- *Myotis evotis* can switch between two foraging modes, aerial hawking and gleaning, which requires a wider range of echolocation frequencies.

Objectives and Hypotheses

- Characterize echolocation behavior of *M. evotis* in open and closed habitat types using bandwidth, mean characteristic frequency (Fc), and mean pulse upslope and downslope slopes as parameters.
- Hypothesis 1: Broader bandwidths and steeper upslope and downslope slopes indicate echolocation behavior in closed habitats.
- Hypothesis 2: Narrow bandwidths and shallower upslope and downslope slopes indicate echolocation behavior in open habitats.

Materials and Methods

- Calls were recorded using Wildlife Acoustics SM2BAT and SM4BAT detectors.
- Sample size: 5 calls from closed lodgepole pine (Pinus contorta) forest, 10 calls from Douglas fir (Pseudotsuga menziesii) forest, 23 calls from open lodgepole pine forest, and 12 calls from ponderosa pine (Pinus ponderosa) woodlands.
- We used SonoBat 4.4 to identify and only analyzed calls with a ≥ 95% call-matching threshold.

Results

- Figure 1: Spectrogram image of a *Myotis lucifugus* echolocation call pulse. *Downslope*: slope of the pulse between and the knee and the Fc. *Upslope*: slope of the pulse between the high frequency and the knee. *High f*: highest frequency (kHz). *Low f*: lowest frequency (kHz).

Conclusions

- Results provided little support to hypotheses, as no significant variation was found between mean bandwidth and mean upslope in habitat types.
- However, results showed significant variation in mean downslope between open ponderosa pine and open lodgepole pine habitats and between closed Douglas fir and open lodgepole pine (p<0.01 and p<0.05 respectively) habitats.
- It is likely that the small sample size from the closed lodgepole pine habitat contributed to insignificance in mean upslope (n=5, p=0.0548).
- Next steps: Further analyses could determine if foraging behavior is contributing to variation in echolocation of *M. evotis*.

References

