Spatial and temporal variation in vibratory noise and its impact potential on a common urban arthropod

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Key words (up to 12):

Abstract (up to 300 words):

**INTRODUCTION**

Questions

* To what degree does vibratory noise vary across space?
* How does vibratory noise vary over time?

**MATERIALS AND METHODS**

**Survey sites**

We recorded substrate-borne (vibratory) noise at 21 private properties in Lancaster County, Nebraska, United States in 2020 and added an additional private property and the University of Nebraska-Lincoln city campus in 2022. In 2020, we sent an email to listservs of the biological sciences and entomology departments at the University of Nebraska-Lincoln asking for volunteers to allow us to record ambient vibrations at their properties. We received permission to access private properties for the duration of the study from faculty, staff, and graduate students, as well as a few personal connections with properties well-scattered across Lincoln, Nebraska, and into the surrounding rural area (Fig. ). We added the two sites in 2022 because we collected *Agelenopsis pennsylvanica* spiders from these sites for experiments.

We sorted the 23 sites into two categories based on land cover class: urban and rural. Anthropogenic sources of vibratory noise are thought to travel up to 1 kilometer from the source (Lecocq et al., 2020). As such, we used QGIS (3.16.3-Hannover, ESRI 102704) to calculate the area of each land cover class from the 2019 National Land Cover Database (U.S. Geological Survey, 2019; 30-meter resolution) within a 1-kilometer radius of each site. We combined designations of ‘Developed’ to describe urban area and designations of ‘Planted/Cultivated’ to describe agricultural area (https://www.mrlc.gov/data/legends/

national-land-cover-database-class-legend-and-description). The remaining classes were combined as other area. We categorized sites as urban that had more urban than agricultural area and sites as rural that had more agricultural than urban area (Fig. ).

**Vibratory noise across space**

We recorded ambient vibrations with a contact microphone (Kmise, Model KP-01, China) connected to a Tascam DR-05X digital recorder (TEAC Corporation, Tokyo, Japan).

* Schedule for recording collection
* File processing in Raven Pro
* PCA and Spatial analysis

Vibratory noise across time

* Season and harvest
* 24 hours

Spider choice test

Spider activity patterns

**RESULTS**

**DISCUSSION**

**CONCLUSIONS**

**ACKNOWLEDGEMENTS**

**REFERENCES**

**FIGURE LEGENDS**

**TABLES**