

Singing silver-haired bats (*Lasionycteris noctivagans*)

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Photo: Jason Headley, AB

We recorded songs produced by silver-haired bats (*Lasionycteris noctivagans*). These are social vocalizations with distinctive pulse patterns. They appear to be unique, providing another trait upon which to base acoustic identification of this species.

Study Areas:

- Focal study locations: two mine hibernacula for silver-haired bats in British Columbia, Canada.
- To provide landscape and temporal context, we summarize acoustic datasets from numerous locations across western North America between 2005 – 2022 (Figure 1).

Terminology:

- Song Phrase – ordered series of 3 distinct call (pulse) types (Figures 2 and 3):

Lead, then Droplet, ending in a series of Chirps

Function of songs:

- Unknown, however, as other bat species produce songs for mating, we propose silver-haired bat songs may similarly be associated with courtship or mating.
- Alternative functions cannot be ruled out, particularly because we recorded some songs outside of the accepted mating period.

Mating Period:

- Other research has determined peak mating of silver-haired bats occurs in fall, and spring mating has been documented^{1,2}.
- We observed evidence of winter mating in British Columbia (observations when free-flying male and female bats were captured outside mine hibernaculum during winter).

Proportion of silver-haired bat songs recorded relative to echolocation recordings varied across locations and seasons (Figure 4).

- We recorded songs in all months of the year.
- 93.4% (of 1857 song recordings) were produced outside of summer months.
- The small level of song production mid-summer could be associated with:

- learning or practice, establishing or maintaining social bonds, or male-male competition?
- mating season starting earlier in summer than expected for some individuals?

This is an accepted manuscript in *Wildlife Society Bulletin*; a subset of recordings will be available publicly through *Dryad*.

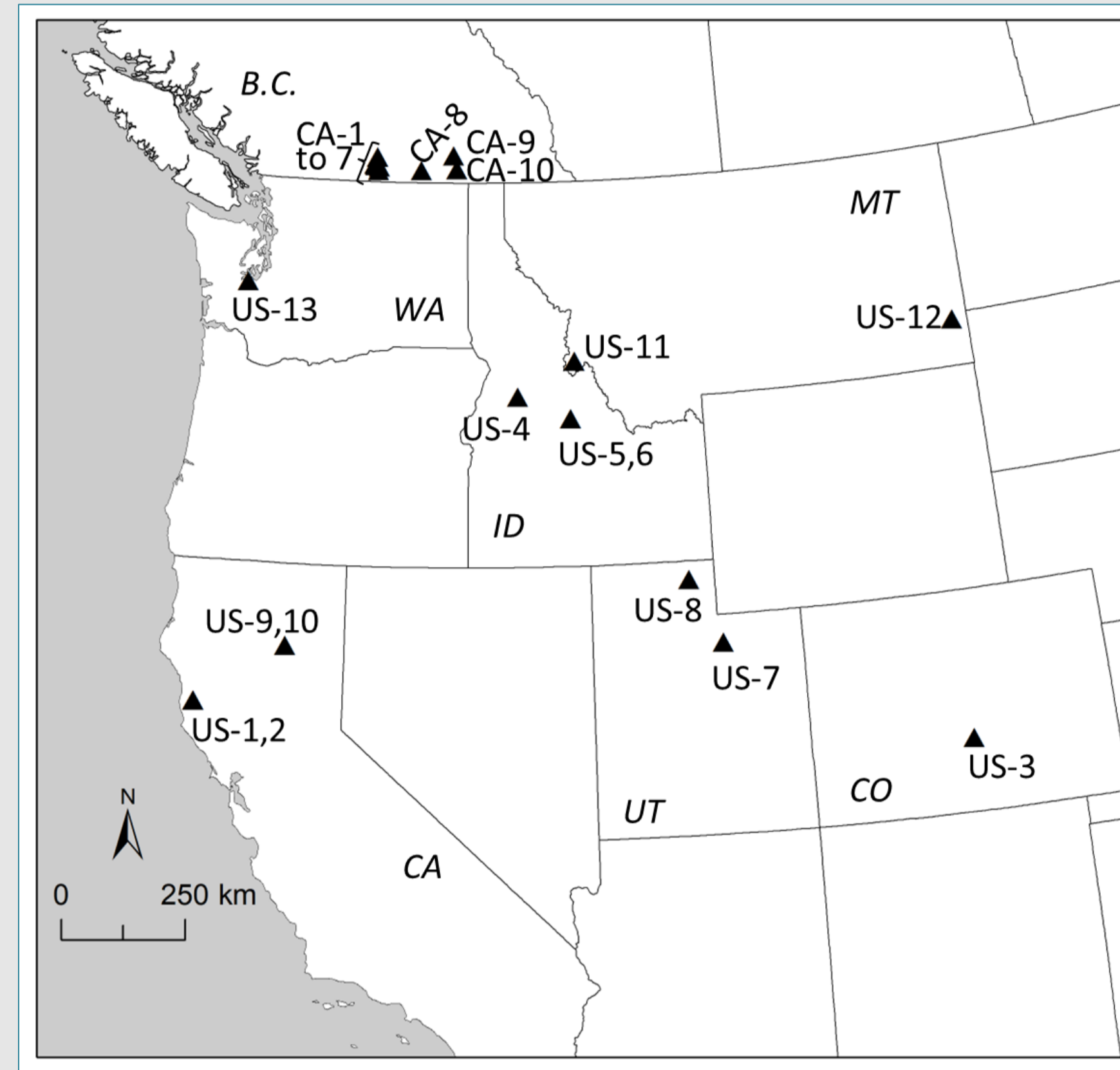


Figure 1. Map of all recording locations. CA-9, CA-10 are mine hibernacula for silver-haired bats. Some silver-haired bats reside year-round at these mines (based on mark recapture of banded individuals^{3,4}).

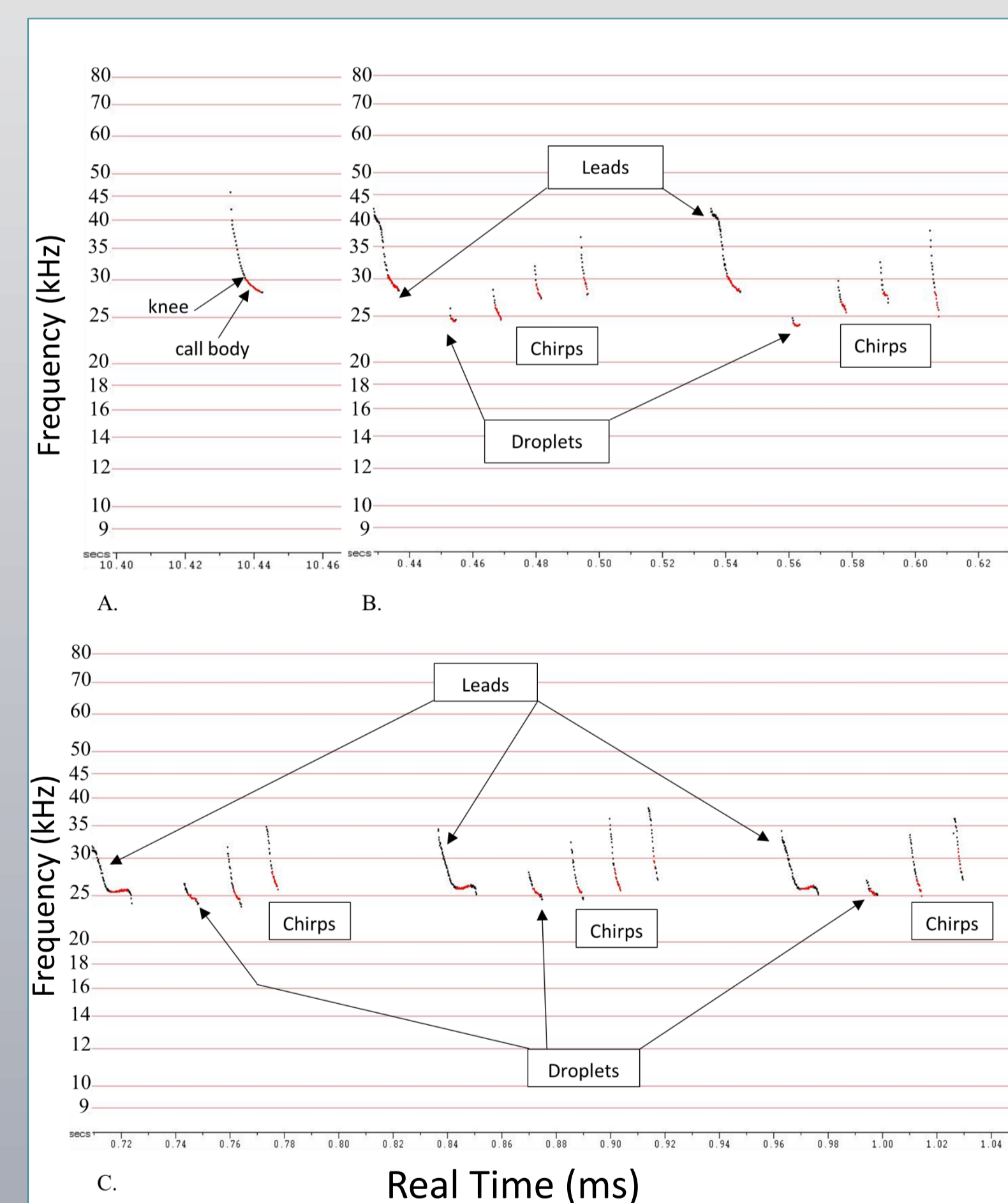


Figure 2. A) Shows typical short duration echolocation pulses of silver-haired bat. B) and C) are typical phrases of silver-haired bat songs, each containing 3 syllable types (Lead, Droplet, Chirps). B) Shows Lead resembling echolocation pulse except for an upsweep into the pulse. C) Shows Lead with accentuated knee just prior to a flat call body. All x-axes are 0.01 ms per tick mark. Recordings are zero-crossing, viewed in Analook.

LITERATURE CITED

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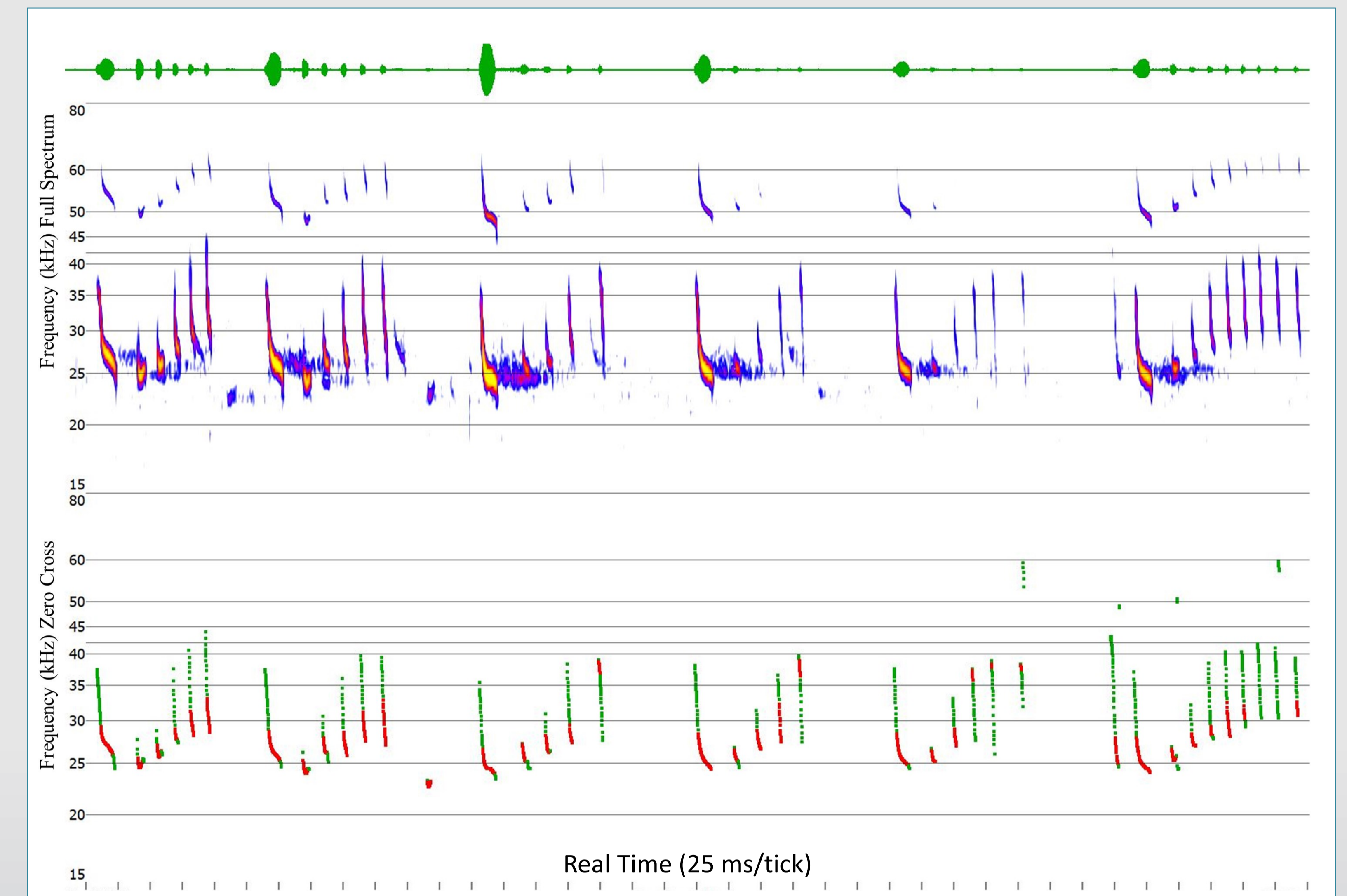


Figure 3. A spectrogram displayed in real time in both full spectrum (top) and zero-cross (bottom) using Anabat Insight software (time axis F6). Second harmonics are visible in top full spectrum spectrogram.

Seasonal Variation in Song Production

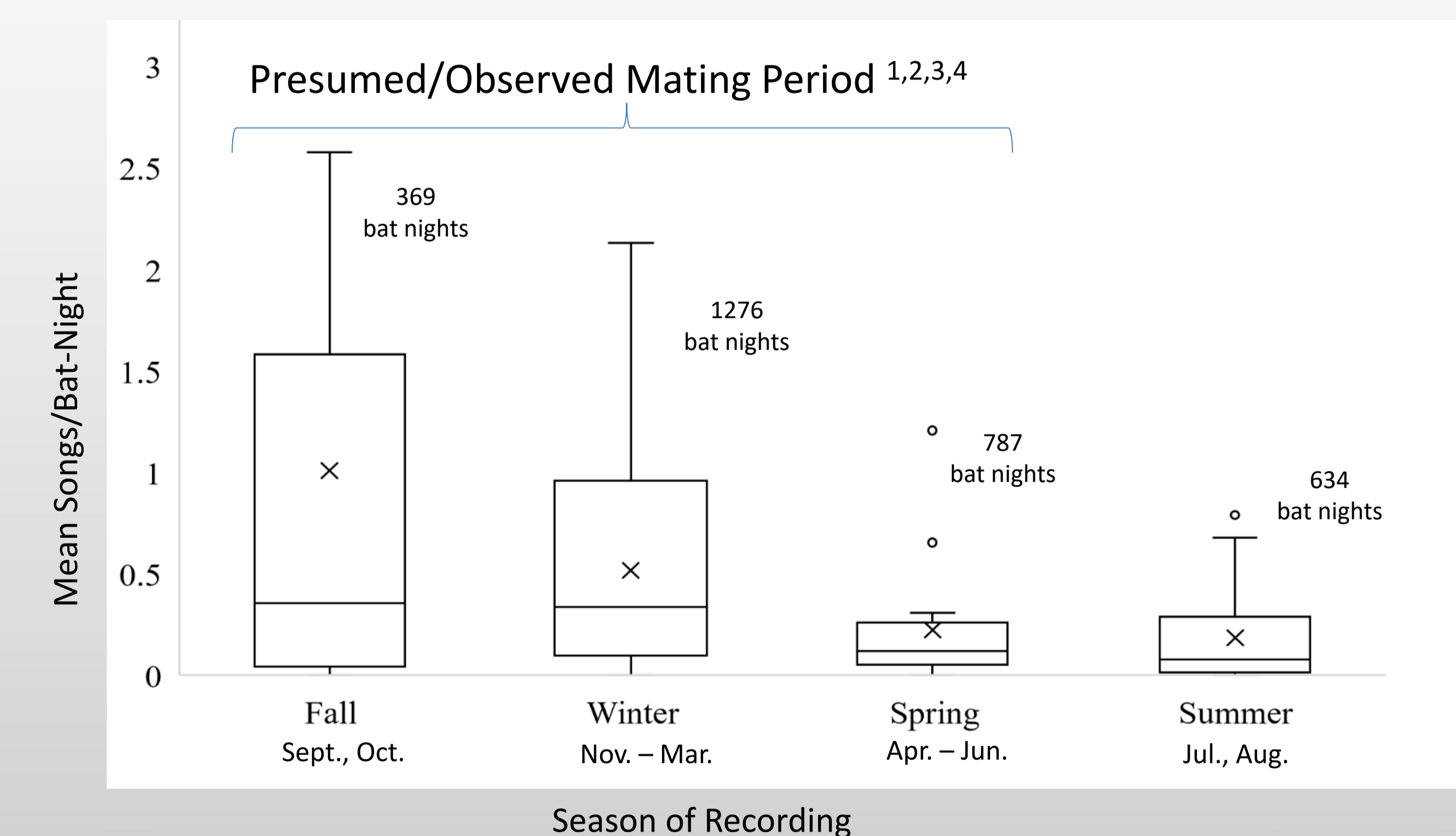


Figure 4. Box plot showing mean number of song files recorded per bat-night across all sites by season. Number of nights of monitoring and number of detectors varied per site.

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