Analysis on the variation of bird song over a 24-hour period

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Background

- We began this study with the goal of getting a better background of understanding of how certain factors effect bird song rate. There is already some research on similar subjects, we are looking to add to this knowledge. (Ball et al., 2011; Åkesson et al., 2021; Hannah et al. 2022)
- This study was conducted on three different boreal migratory bird species:
  - -Tennessee Warbler, *Leiothlypis peregrina,* (TEWA)
  - -White Throated Sparrow*, Zonotrichia albicollis,* (WTSP)
  - -Swainson's Thrush, *Catharus ustulatus*, (SWTH)
- We focused on two main variables, looking at how they affected 24 hour singing patterns

Temporal Change

- How the change in season over 12 days affects singing patterns

Spatial Variation

- How variation in latitude (North vs South) affects singing patterns
- We predicted that singing rates would be different in Northern vs Southern sites due to difference in daylight. We also predicted that due to the ending of the breeding period song rate would decrease with change in season.

Methods

1 Study Area

We used Autonomous Recording Unit (ARU) data previously recorded by the U of A Bioacoustics Unit from sites in and near Alberta

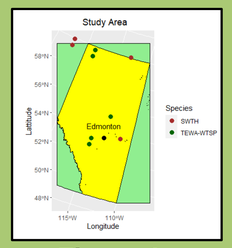


Figure 1
Study area map of points surveyed

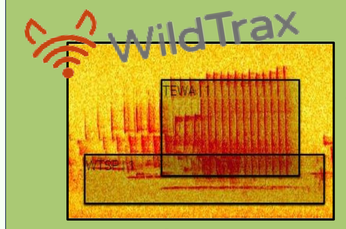


Figure 2
Spectrogram depicting TEWA and WTSP songs in WIldTrax

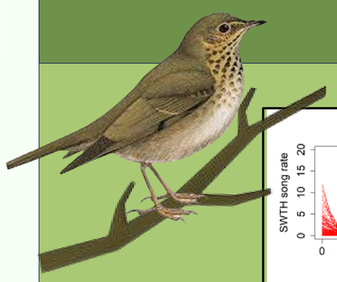
2 Data Processing

Bird songs were identified through visual and audio analysis of recordings

3 Data Analysis

We used data analysis program R-Studio to create bootstrapped models of song rate, (Kumar, 2021; Royston, Ambler, 1998; Wood, Schpiel, 2020)

Results



SWTH

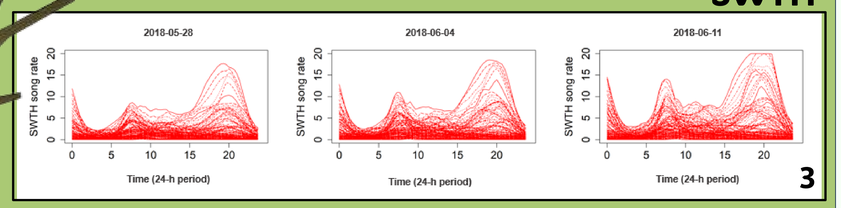


Figure 3
Fluctuation in SWTH song rate over a 24-hour period with seasonal change taken from Southern Alberta

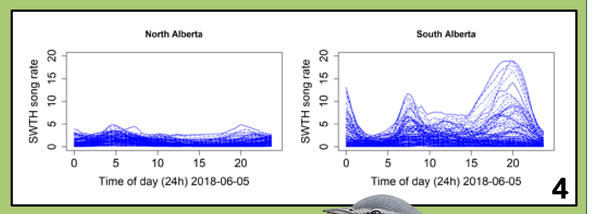
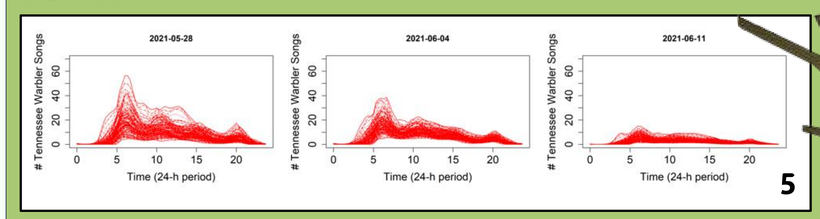


Figure 4
Fluctuation in SWTH song rate over a 24-hour period in Northern vs Southern sites

TEWA



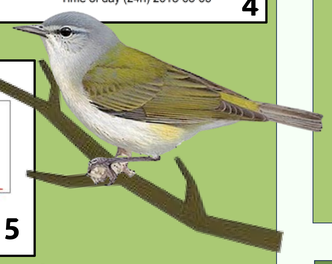


Figure 5
Fluctuation in TEWA song rate over a 24-hour period with seasonal change taken from a site in central Alberta

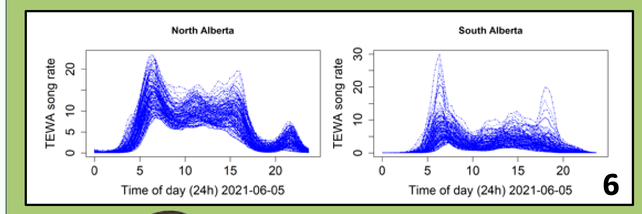


Figure 6
Fluctuation in TEWA song rate over a 24-hour period in Northern vs Southern sites

WTSP

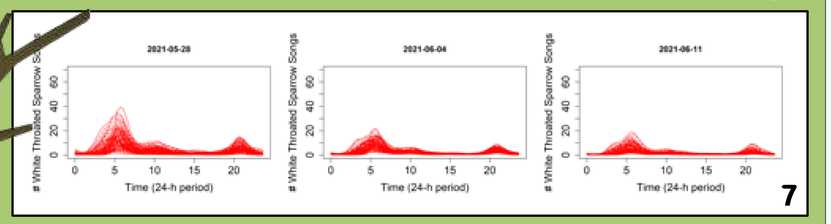


Figure 7
Fluctuation in WTSP song rate over a 24-hour period with seasonal change taken from a site in central Alberta

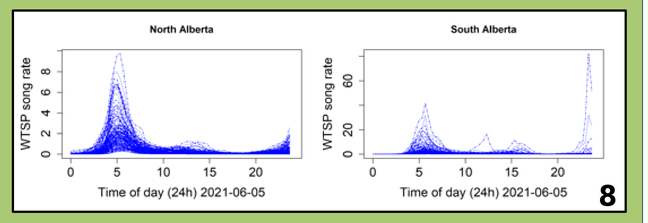


Figure 8
Fluctuation in WTSP song rate over a 24-hour period in Northern vs Southern sites

Discussion

- SWTH song rate is higher in southern Alberta with clear peaks at dawn and dusk but is more consistent over 24 hours in northern Alberta; its song rate slightly increases as the season advances.
- -The TEWA songs begin earlier and are more maintained at Northern latitudes; its song rate decreases as the season advances.
- -The WTSP begins singing earlier in the morning at Northern latitudes, though it sings more at Southern latitudes; its song rate slightly decreases as the season advances.
- -The decrease in song rate for TEWA and WTSP over the season is likely due to the ending of the breeding and migration periods during which these birds are most active; the SWTH song rate increase is unexpected.
- -The variation in song rate due to latitude is most likely due to differences in daylight (e.g., daylight hours in the North). Variations may also be due to differences in temperature, ecological niche, bird abundance, and physical attributes.
- -Additional inquiries should be made to solidify the reasoning for these, as well as view how human disturbances (e.g., light pollution) could affect these patterns.

References

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