Temporal Variation in Black-throated Green Warbler Song

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INTRODUCTION

- Autonomous Recording Units (ARUs) are used to collect vocalizations of many acoustic species, such as birds[1].

- The acoustic data is used to monitor the species in question.

- Singing behavior (e.g. song type) of male birds changes throughout the season[2], but there is little information on whether there are changes throughout the day.

- If vocal trends occur, they may be used to indicate the breeding status of the bird species, as well as environmental factors and territorial circumstances.

Purpose

Determine if there is a trend in the singing behavior of Black-throated Green Warblers (BTNW) over the course of the day, as well as the season.

https://commons.wikimedia.org/wiki/File:Black-throated_Green_Warbler_3.jpg

Figure 1. Black-throated Green Warbler, *Setophaga virens*.

METHODS

- ARUs were deployed throughout Alberta in the spring and summer of 2014 through 2016.
- ARUs were set to record vocalizations in the pre-dawn, dawn, and post-dawn portions of the morning.
- Resulting recordings were scanned for BTNW songs in the program Audacity[3].
- The vocalizations were classified as song type A or B (Figure 2).
- Logistic regression analysis was conducted in R[4].
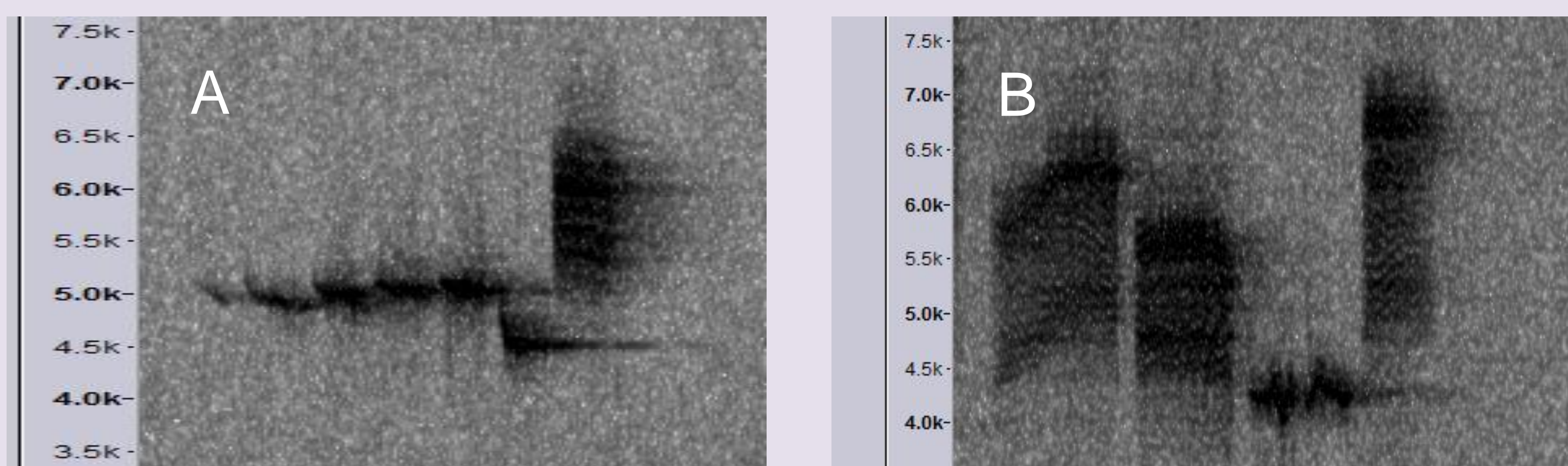

Figure 2. Spectrograms of BTNW song types A and B as viewed in Audacity. X-axis represents time in seconds, Y-axis represents frequency in kilohertz.

RESULTS

- BTNW were detected between May 30th 2014, and June 18th 2014 between 5:00 and 9:00 AM.

- In 2015, BTNW were detected between May 28th and June 30th, between 2:00 and 5:25 AM.

- 2016 detections occurred between May 18th and July 4th, from 4:38 and 9:58 AM.

- A total of 77 detections were of song type A, and 85 were of song type B.

- There was no significant effect of date on song type ($p=0.121$).

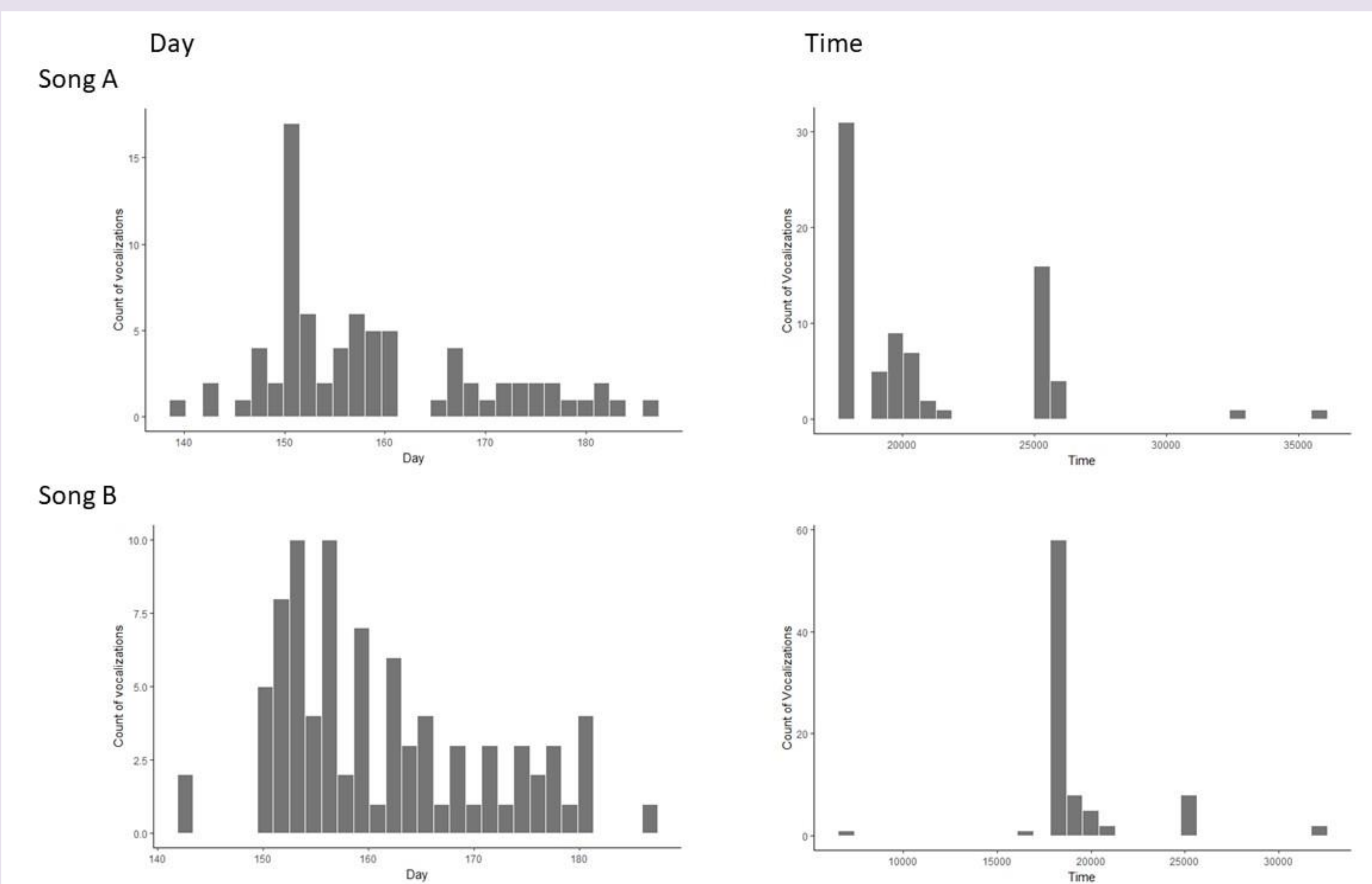- There was a significant effect of time of day on song type ($p=0.0032$).

Figure 3. Histograms of frequency of BTNW vocalizations against day of the year, and seconds after midnight. A total of 162 vocalizations were detected by ARUs across Alberta. Day 139 is May 15th, and day 186 is July 4th. 7200 seconds represents 2:00 AM, and 35 891 seconds represents 9:58 AM.

CONCLUSIONS

- Date throughout the season does not have an influence on BTNW song types.
- Previous studies indicate that song A is more common prior to breeding, however we did not have breeding information for the data we collected[5].
- Song type A is sung more evenly throughout the morning.
- Song type B is sung more commonly during the dawn period of the morning.
- Temporal variation in song suggests that type communicates different information (e.g. territory defense, aggression[6], mate fertility[7])

https://www.flickr.com/photos/frodejacobsen/7489655820

Figure 4. Black-throated Green Warbler, *Setophaga virens*.

REFERENCES

1. Shonfield, J. & Bayne, E. M. (2017). Autonomous recording units in avian ecological research: current use and future application. *Avian Conservation & Ecology*, 12, 14.
2. Robertson, B.A., Fontaine, J.J., Loomis, E. (2009). Seasonal Patterns of Song Structure Variation in a Suboscine Passerine, *The Wilson Journal of Ornithology*. 121,815-818.
3. http://audacityteam.org/
4. R Development Core Team (2008). http://www.R-project.org.
5. Morse, D. H. (1970). Differences between courtship and territorial songs. *Nature*, 226,659-661.
6. Snijder, L., van Pooij, E.P., Henskens, M.F.A., van Oers K, Naguib, M. (2015). Dawn song predicts behavior during territory conflicts in personality-typed great tits, *Animal Behavior*. 109, 45-52.
7. Foote, J. R., Fitzsimmons, L.P., Mennill, D.J., Ratcliffe, L.M. (2008). Tied to the nest: male black-capped chickadees decrease dawn chorus movement behavior when their mate is fertile, *Animal Behavior*. 76, 1227-1233.

ACKNOWLEDGEMENTS

E.H.A.