2021 Beaverhill Natural Area Grassland Breeding Bird Census: Summary and Interpretation of Results

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Introduction

Humans have invented a wide variety of instruments to monitor the health of ecosystems. However, in some cases we can examine change in the habitat without instruments because studying the presence and behavior of birds can inform us about changing ecosystems (Hill, 2021). When birds are dependant on the habitat functioning in specific ways, the population trends of specific birds can tell us about how well the ecosystem functions (Hill, 2021). Bird population monitoring has been an important practice in the conservation community for over a century, ranging from citizen science projects such as the Christmas Bird Count which started in the year 1900 (Godfrey, W. et al. 2013), to long term monitoring such as grid censuses and bird banding. Birds are a powerful tool of environmental monitoring on account of their ecological diversity. As annual population fluctuations give little information on environmental monitoring, long-term projects are necessary (Järvinen & Väisänen, 1979).

The Beaverhill Bird Observatory is involved in numerous monitoring programs including migration monitoring, summer MAPS (Monitoring Avian Productivity and Survivorship) program, and owl migration monitoring. There are two breeding bird censuses that take place at BBO each summer: a forest breeding bird census and a grassland breeding bird census. These censuses are in place to determine species diversity in the natural area, habitat preferences of breeding birds, and density of breeding territories. The grassland breeding bird census is located along what used to be the south shore of Beaverhill Lake. Beaverhill Lake is a shallow lake located about 75 km east of Edmonton, east of the town of Tofield. The lake is designated as a Nationally Important Wetland under the RAMSAR convention and is an important staging area for tens of thousands of migrating waterfowl and shorebirds (Beaverhill Bird Observatory,

2021). The grassland breeding bird census was first conducted in 1992, and serves as a long term monitoring project that shows population and territory trends of many bird species.

Methods

Study Area

The study area is divided into various points arranged on a grid where each point is 50m apart. The survey points included rows A-F, numbered 1-11; row G numbered 1-9, and row H numbered 1-8, for a total of 83 different survey points. This makes for a roughly 51 acre survey area. Rows A and B are mainly in the forested area and include Sora Pond, rows C and D are within the shrubby willow dominated area, and rows E-H are in the open grassland area with willows scattered throughout. Points A7 and A8 were difficult to navigate to, as they were within Sora Pond surrounded by water and thick mud. In this case, surveys were completed as close to these points as possible.

Data collection

Seven full census surveys were carried out over the course of seven visits, which occurred on the mornings of June 6, 12, 20, 26; and July 3, 10, and 17. All surveys were completed by Ryan Corp. The average start time for the seven surveys was about 5:20 am, and took between 5 and 6 hours to complete. Starting temperatures ranged from 8-16^{o}C throughout the summer. The grid was navigated along the rows running east to west with 2-6 minute stops at each survey point depending on the level of bird activity encountered. All location points were navigated using a Garmin GPS system which served as the primary navigation tool for each survey. Individuals were identified to species by song or by sight, and their location was then recorded. Each bird species was written down using a standard 4 letter shorthand code.

Simultaneous calls from different birds of the same species were connected with dotted lines which was a helpful tool to map out territory boundaries.

Data Interpretation

After all 7 census surveys had been completed, species specific territory maps were created for the 13 most common and widespread species observed. These maps were created using a lettering system (A-G) denoting observations from each survey. Letter A was used for survey 1, B for survey 2, and so on. Approximate territory boundaries were then created for each species based on groupings and counter-singing events. Less common species were not mapped if they were only observed for one of the surveys, or were too sparse throughout the summer to create any respectable territories. Territory guidelines detailed in Bibby et al. (1992) state that consistent observations in a certain area over 10+ days are needed in order to classify a cluster. To keep territory mapping relatively consistent with previous years' methods, if there was a small area that only had two observations 7 days (or one survey) apart, this was also considered a cluster. Birds were excluded from a territory if they were deemed to be too far from a cluster to make a territory of reasonable size.

Results

A total of 31 different bird species were observed by sight or sound throughout the 7 visits. The most common species identified was the Common Yellowthroat at 49 territories, while the Clay-colored Sparrow came in a close second at 48 territories. Other common species included Yellow Warbler (41), LeConte's Sparrow (24), Least Flycatcher (21), Red-winged Blackbird (18), Nelsons Sparrow (13), Savannah Sparrow (7), Sedge Wren (6), Alder Flycatcher (6), Sora (6), Brown-headed Cowbird (5), and House Wren (1). The territory numbers for the

Common Yellowthroat were the highest ever recorded, and by a large margin. The grassland grid census survey in 2020 observed 24 Common Yellowthroat territories, making this year's territory numbers over double the previous high. Territories could only be determined for 13 of the 31 species observed as summarized in Table 1. The remaining 18 species did not indicate any territories since some species were seen only flying overhead such as the White-faced Ibis and Black Tern, or there were too few observations in total to indicate a territory.

Table 1.0 Number of territories and densities of breeding bird species in the grassland grid in the Beaverhill Lake Natural Area in June and July 2021.

Species Recorded	Number of Territories	Density (territories per acre)
Common Yellowthroat	49	0.96
Clay-colored Sparrow	48	0.94
Yellow warbler	41	0.80
LeConte's Sparrow	24	0.47
Least Flycatcher	21	0.41
Red-Winged Blackbird	18	0.35
Nelsons Sparrow	13	0.25
Savannah Sparrow	7	0.14
Sedge Wren	6	0.12
Alder Flycatcher	6	0.12
Sora	6	0.12
Brown-Headed Cowbird	5	0.10
House Wren	1	0.02

Discussion

This year's survey showed a total of 245 territories belonging to 13 species, producing the second highest total territory number in the history of the census with only the 2016 census

showing a higher number at 299 total territories. Species distribution tended to reflect habitat type, yet a few species showed less preference when it came to habitat. Brown-headed Cowbirds were seen atop tall aspen trees, willows, and occasionally rummaging in the grassland area. Red-winged Blackbirds dominated Sora Pond and had the highest territory density per area. This made it difficult to distinguish separate territories since sightings were in such close proximity to one another. Clay-colored Sparrows were abundant, but most territories were concentrated in the shrubby willow area between the forest and open grassland. The most common species in the open grassland area of the grid included the Nelsons Sparrow, LeConte's Sparrow, Common Yellowthroat and Savannah Sparrow. The jump in territory numbers of Common Yellowthroats may be attributed to the ever changing water level of Beaverhill Lake. The spring of 2020 was the wettest year that the Beaverhill Bird Observatory had experienced in a decade (Beaverhill Bird Observatory, 2021). More and more open water has been visible on the lake in the past few years, which could explain the spike in Common Yellowthroat numbers since their preferred habitat is marshes, wetland edges, and brushy fields (Cornell Lab of Ornithology, 2019).

An important factor that influences this survey from year to year is observer bias. Differences in hearing and overall experience can result in slightly different numbers when someone else carries out the census. Interpretation of territories may also differ based on how an individual perceives what constitutes a cluster and what does not. Comparisons between data from multiple years can be somewhat inconsistent as a result, but still serve as a solid baseline in species trends. The weather did not pose any threats or setbacks to most of the surveys other than a thunderstorm that occurred the night before the final survey, which may have been the reason for the small number of birds observed in relation to the other 6 surveys. This summer the Beaverhill Natural Area and many other parts of Canada experienced record high temperatures

and multiple heat waves. Starting each survey early in the morning made it possible to finish before the heat became a health concern to the observer. Temperature did not seem to have a significant affect on the total number of birds observed each week.

Conclusion

Studying the behavior of birds can inform us about changing ecosystems. The grassland breeding bird census provides valuable data on population trends across dozens of avian species. The data shown in this year's census shows an increase in territory numbers, most notably the Common Yellowthroat. These findings may help draw conclusions about how the ecosystem and landscape is shifting, and serve as valuable data additions to the project of monitoring breeding birds and environmental changes at Beaverhill Lake.

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