

2018 Grassland Breeding Bird Census at Beaverhill Natural Area, Alberta

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Introduction

As a landscape changes so can its inhabitants. Environmental factors such as a lake drying up, or the succession of vegetation into new regions can drive these changes. Valuable information can be gathered about how these shifts affect the dominant species present can be gathered by monitoring these areas that are affected (McCollin, 2000). One popular subject of these monitoring projects is birds (Wade et al., 2014). As they set-up territories it becomes easy to record the species present and their numbers via tracking of their calls and sightings (Conway, 2011). These records can provide valuable information on how the shift in vegetation lends itself to the types of habitats suitable for different species and how the species who make these places their home, change.

One such location is Beaverhill Lake where the lake shoreline has receded in the past 15 years (Beaverhill Bird Observatory, 2018). Beaverhill Lake was designated an Important Bird Area in 1987 due to its importance as a migratory stopover and important habitat for waterfowl and shorebirds (Important Bird Area Canada, 2018). Beaverhill Natural Area is located on the south shore of Beaverhill Lake. With the shoreline receding the vegetation on the historical shoreline and surrounding area is changing. The grassland region has become larger and the original grassland is being invaded by willows and aspen trees. To monitor the effects this has had on the species in the area, a grassland grid made up of 50 by 50-meter regions totaling 18.9 hectares was established in 1992, to track the different inhabitants (Holroyd, 1992). The tracking of species variety and density in this region has been sporadically monitored for the past 26 years and the census this year marks the continuation of that as the ninth collection of breeding bird territories in the grassland grid.

Methods

Study Area

For 2018 the grid remained in the same location as established in past years. Each observation point was located using the provided Garmin GPS. When possible, all observations were made from the historical wooden stakes marked with flagging tape where they remained. Points moving south-to-north were labeled A through H with a Z row to the south of the A row, and west-to-east points were labeled 0 to 11. Observations were not recorded from point Z07 as the marsh known on site as Sora's Pond was inaccessible.

A variety of vegetation is present through the census site ranging from dry grasses in the north with birch and deciduous forest to the south edge. The grasses were dominant in rows E through H with intermittent patches of shrub. Rows B to D were being overtaken by large, dense shrubs mostly made up of willows. Row A ran alongside the forest. As you moved east through the grid towards the weir, the soil became more water saturated. This became noticeable at points 8 and onward.

Data Collection

Censuses were completed on a weekly basis for a total of six weeks. Dates of the collections were June 3, 13, 20, 27, July 4, and 11. Initially the intention was to complete the census on the Sunday of every week but a heavy rain on the morning of June 10 required delaying data collection. Data collection resumed on June 13 and then data was collected on a weekly basis each Wednesday forward. Start times for data collection was at approximately 7:30

am each day with the average time to complete the grid taking approximately three and a half hours. Temperature was recorded on each day as well and ranged from 16 to 21 degrees Celsius.

Time at each location varied depending on number of calls present and typically ranged from two to five minutes. Every species of bird present was given a four-letter unique code as to be able to make recordings in a timely manner and later data easy to understand. Primary identification of birds was completed by identifying the calls made and recording on the grid map in the approximate direction and distance from the point. Birds recorded in this manner had their code circled to mark they were calling from this location. If two birds were calling simultaneously at one point their codes were connected using a dashed line with arrows at either end. Individuals who were observed calling from one location then moving to next had a solid line added showing the direction of travel and an arrow at the end to mark their landing destination. If no destination was observed the arrow was placed in the center of the line to indicate the direction of travel. When possible to identify birds via sight they were also recorded with their code being left un-circled.

Data Analysis

After completing the six censuses all records were transferred to separate species-specific maps. Each sighting of an individual was marked with the numbers 1 thru 6 corresponding to the trip it was seen on to aid in proper identification of clusters and territories. All additional information such as flight paths, competing calls, and visual sightings were also recorded on the new maps. In instances where competing calls were marked it was assumed that these indicated the boundaries between two territories. Guidelines to determine the breeding territories are outlined by the Bird Census guidelines in Bibby et al. (1992).

Results

The 2018-year census noted a total of 95 different territories (Table 1). This number indicates a third year of total territory declines when comparing to the 2016 and 2017 censuses. The most dominant species for a third year was Clay-coloured Sparrow with 23 territories, with Yellow Warbler close behind with 20 territories. The Savannah Sparrow, while higher in density in past years, only showed up in small numbers this year with 6 territories identified.

To measure the changes the diversity and species richness Shannon-Wiener, Pielou's Evenness, and Simpson's Index calculations were completed (Table 2). A Shannon-Wiener Index score of 2.264 was calculated which ranks second highest among all years of the census. This year's Simpson's Index score of 0.141, measured on a scale of zero to one showing low to high diversity respectively, was lower than 2017's of 0.785 but more like the values seen in past years. The Pielou's Evenness Index is the highest in the history of the census at 0.817 which means many of the recorded species appeared in similar numbers.

Table 1. Breeding territories, by species, present for each year's grassland census at Beaverhill Lake, Alberta

Species	Year of Breeding Bird Census							
	1992	1993	2004	2013	2014	2016	2017	2018
Mallard	4	6	0	0	0	3	0	2
Gadwall	0	0	0	0	0.5	0	0	0
Northern Shoveler	1	0	0	0	0	2	0	0
Blue-winged Teal	3	0	0.5	0	0	1	0	0
Lesser Scaup	6	0	0	0	0	0	0	0
Duck spp.	6	2	0	0.2	0	0	1	0
Sora	0	0	0	0	0	2	0	0
American Coot	0	0	0	0	1	0	0	0
Wilson's Phalarope	11	5	0	0	0	0	1	1
American Bittern	0	0	0	0	0.5	1	0	0
Broad Winged Hawk	0	0	0	0	0	1	0	0
Northern Harrier	0	1	1	0	0	0	0	0
Short-eared Owl	0	0	1	0	0	0	0	0
Alder Flycatcher	0	0	0	0	1.5	13	5	12
Least Flycatcher	0	0	3	3.8	8	27	3	2
Marsh Wren	0	0	0.5	0	0	0	0	0

2018 Results of the Grassland Breeding Bird Census

House Wren	0	0	0	0	0	1	4	1
American Robin	0	0	0	0	0.5	0	0	0
Grey Catbird	0	0	0	0	1	0	0	3
Yellow Warbler	2	2	4.5	7.8	6	43	24	20
Yellow-rumped Warbler	0	0	0	0	0	16.5	4	6
American Redstart	0	0	0	0	0	7	0	0
Common Yellowthroat	1.5	2.5	4	0	0	0	1	9
Savannah Sparrow	48	35	32	25.4	11	53	32	6
Clay-colored Sparrow	6	5	16	43.4	10	83	42	23
Le Conte's Sparrow	4	6	1	0	0.5	7	0	0
Lincoln's Sparrow	0	0	1	0	1	0	0	1
Sharp-tailed Sparrow	9	7	4	0	0	0	0	0
Song Sparrow	0	0	1	0	0	0	3	4
Vesper Sparrow	0	0	0	0	0	16	0	0
Rose-breasted Grosbeak	0	0	0	0	0	4	0	0
Red-winged Blackbird	16.5	17	0.5	0.2	2	1	4	2
Yellow-headed Blackbird	3	0	0	0	0	0	0	1
Brewer's Blackbird	0	0	1	0	1	0	0	0
Baltimore Oriole	0	0	0	0	0	5.5	0	0
Brown-headed Cowbird	0	0	0	0	2	10	0	2
Black-capped Chickadee	0	0	0	0.8	0	0	0	0
Warbling Vireo	0	0	0	0.8	0	0	0	0
Total	121	88.5	71	82.4	47.5	299	125	95

Table 2. Comparing the species richness, diversity, and evenness in the grassland breeding bird grid history at Beaverhill Lake, Alberta

Census Year	Species Richness	Shannon-Wiener Index	Simpson's Index	Pielou's Evenness Index
1992	14	0.506	0.201	0.192
1993	11	0.544	0.217	0.227
2004	15	0.557	0.267	0.206
2013	8	1.184	0.384	0.570
2014	16	0.513	0.149	0.185
2016	21	2.284	0.143	0.750
2017	13	1.825	0.785	0.378
2018	16	2.264	0.141	0.817

Discussion

Despite 2018 marking the second year in a row with a decline in the total number of territories it still resulted in the second highest Shannon-Wiener Index and the highest Pielou's Evenness Index scores recorded during the census. This means that even though fewer total birds are using the grasslands to nest the variety is high and the number of each of those species is similar. Of the three species that tend to be most dominant among each year's recordings the Yellow Warbler maintained a similar number to past years while both the Clay-colored Sparrow and the Savannah Sparrow saw a decline in numbers. This could be due to a change in the needs of these two species to be able to establish proper nests and territories. It is possible this is also due to other reasons such as poor conditions in their wintering habitat or being able to source other high-quality nesting sites in other areas. One species to keep an eye on is the Common Yellowthroat which saw an increase in territories after having been largely absent in the region for several of the census years.

Conclusion

The 2018 census is the first time in the census's history where three consecutive years worth of data has been collected. This adds value to this year's data as it can be used effectively to start observing trends in the grasslands. This provides valuable information and continuity in the tracking of observable species. Hopefully this study will continue annually ensuring the information will become more valuable as the process of succession progresses from the lake drying up to grassland and perhaps trees and shrubs taking over. Being able to see the trends in the types of species breeding in the area will provide insight into this process and information about the habitat these species prefer to nest in. This, however, does not detract the value of the historical data from census's done in the recent past of the Beaverhill Lake grassland. The 1992,

1993, and 2004 data sets will continue to provide a valuable baseline as to what has been observed in past decades.

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Bibliography

- Beaverhill Bird Observatory. (2018). *Beaverhill Lake*. Retrieved from: <http://beaverhillbirds.com/welcome/beaverhill-lake/>
- Bibby, C., Burgess, N., & Hill D. (1992). *Bird Census Techniques*. San Diego, CA: Academic Press Limited. Retrieved from: <https://books.google.ca/books?id=5TqfwEHCVuoC&lpg=PA42&dq=territory%20mapping%20bird%20census&pg=PP1#v=onepage&q=common%20bird%20census&f=false>
- Conway, C. (2011). Standardized North American Marsh Bird Monitoring Protocol. *Waterbirds: The International Journal of Waterbird Biology*, 34(3), 319-346. Retrieved from <http://www.jstor.org.libezproxy.nait.ca/stable/23018162>
- Holroyd, G. (1992). Grass-sedge wetland breeding bird census. In Rowell, P. (1992), *Beaverhill Bird Observatory 1992 annual report* (29). Tofield, AB: Beaverhill Bird Observatory. Retrieved from: <http://beaverhillbirds.com/media/1121/1992-annualreport.pdf>
- Important Bird Area Canada. (2018). *IBA AB001 Beaverhill Lake Tofield, AB*. Retrieved from: <https://www.ibacanada.com/site.jsp?siteID=AB001>
- McCollin, D., Moore, L., & Sparks, T. (2000). The flora of a cultural landscape: environmental determinants of change revealed using archival sources. *Biological Conservation* 92(2), 249-263. doi: 10.1016/S0006-3207(99)00070-1
- Wade, A. S. I., Barov, B., Burfield, I. J., Gregory, R. D., Norris, K., Vorisek, P., ... Butler, S. J. (2014). A Niche-Based Framework to Assess Current Monitoring of European Forest Birds and Guide Indicator Species' Selection. *PLoS ONE*, 9(5), e97217. doi: 10.1371/journal.pone.0097217