Grassland Breeding Bird Diversity at Beaverhill Lake, Alberta in 2017

By: Hannah Smith, Intern at the Beaverhill Bird Observatory

Background Info

Monitoring bird behaviour and diversity can provide necessary information related to changes in habitat or environment. Bird counts worldwide collect data commonly used to illustrate relationships between bird species and habitat, responses of bird populations to environmental disturbances or population management techniques, estimations of spatial distribution of species, and monitoring population trends (Thompson, 2002). Bird counts are commonly used to determine the success or failure of conservation management programs (Bibby et al., 1992). Breeding Bird Census is one survey technique which results in an estimate of the actual density of breeding birds (Bibby et al., 1992). A sampling frame, or survey grid, is determined, delineated, and marked on a specific habitat to ensure consistency in future surveys. There are two breeding bird census grids at the Beaverhill Natural Area coordinated by the Beaverhill Bird Observatory (BBO) near the south shore of Beaverhill Lake.

Beaverhill Lake, located near Tofield, Alberta, was identified as an Important Bird Area of Global Significance in 1997 due to the large number of birds that use the area as a stopover site during migrations (Beaverhill Bird Observatory, 2017). The large number of birds present in the Beaverhill Lake area means that the species list of birds is extensive and is spread out over different habitats. This is why there are two census grids surveyed by BBO, a forest grid and a grassland grid.

Study area

The survey plot was the same as the plot area (49.6 ha) surveyed in 2016 and established in 2004 (Table 3). Observation points entered in a Garmin GPS unit used in previous breeding bird censuses was used to ensure consistency with the grid points used in previous surveys.

Data collection

The established grid was surveyed a total of six times between June 4, 2017 and June 30, 2017. These dates were: June 4, June 11, June 16, June 23, June 24, and June 30. The grid consisted 17 east-west lines and 9 north-south lines separated by 50m resulting in 99 intersecting points that were recorded using a letter and number system; lines that ran west-east were labelled -1 to 16 with the exception of Z which was only numbered -1 to 7. Lines running from south-north were Z, and A-H. Points A7, A8, and Z7 were excluded from this survey because they were inaccessible due to high water levels in Sora Pond. The same Garmin GPS unit was used each time the grid was surveyed. Upon arrival at an intersection point, the author observed and listened for 2-10 minutes depending on the amount of bird activity.

Data Interpretation

After the surveys were completed, the data were transposed onto species-specific maps in order to determine species-specific territories; this was done in accordance with the Bird Census Guidelines provided by Bibby et al. (1992). Since there were less than 8 visits to the grid, a minimum of two records were required in order to define a cluster or territory. An exception to this rule is the discovery of a nest with eggs or young present for which a single record is enough to define a cluster (Bibby et al., 1992). In order to

define a cluster or territory, the two records must be at least 10 days apart (Bibby et al., 1992).

Results

A total of 125 total territories were recorded in 2017 (Table 2). This can be compared with the results of previous grassland breeding bird censuses in Table 3. Similar to last year's survey, Clay-colored Sparrow was the dominant species with 42 territories. This was down from the 83 territories seen in 2016. Savannah Sparrow, with 32 territories, and Yellow Warbler, with 24 territories, were also very prevalent species.

Species Richness and Diversity

Table 1. Comparison of species richness, evenness, and diversity on the grassland breeding bird grid 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

Discussion

The 2017 survey shows the highest Simpson's index for the grassland grid since the census was undertaken. An index score of one indicates infinite diversity; since the 2017 survey resulted in a score of 0.7849, we are able to note an increase in species diversity as compared to previous studies. It should also be noted that species richness, Shannon-Wiener Index, and Pielou's Evenness Index are all lower than the numbers reported last year. A possible reason for lower territory numbers in 2017 compared to 2016 may have been the dates on which the surveys took place. There were many clusters that were unable to be classified as territories because they were noted only 8 days apart, instead of the required 10 days outlined in the Bird Census Techniques manual (Bibby et al., 1992).

Conclusion

It is difficult to predict any specific trends with species richness and diversity on the grassland grid being that there has never been more than two consecutive years of surveys done. If this survey is carried out in 2018 it will be the first time that there are more than two consecutive sets of data. Continuous monitoring is key in order to notice and minor or major trends within the species present on the grassland grid. Surveys done on both the grassland breeding bird grid, as well as the forest grid, will provide useful information about how species are adapting to the drastic changes in water levels at Beaverhill Lake.

Table 2. Territories for species recorded in the 2017 grassland breeding bird census.

Species	Number of territories

Unknown Duck Species	1
Wilson's Phalarope	1
Red-winged Blackbird	4
Brown-headed Cowbird	1
House Wren	4
Least Flycatcher	3
Alder Flycatcher	5
Common Yellowthroat	1
Yellow-rumped Warbler	4
Yellow Warbler	24
Clay-colored Sparrow	42
Savannah Sparrow	32
Song Sparrow	3
SUM	125

Table 3. Territories recorded in previous grassland breeding bird censuses.

Species	Year of Breeding Bird Census						
	1992	1993	2004	2013	2014	2016	2017
Mallard	4	6	0	0	0	3	0
Gadwall	0	0	0	0	0.5	0	0
Northern Shoveler	1	0	0	0	0	2	0
Blue-winged teal	3	0	0.5	0	0	1	0
Lesser Scaup	6	0	0	0	0	0	0
Unknown duck species	6	2	0	0.2	0	0	1
Sora	0	0	0	0	0	2	0

Species							
American Coot	0	0	0	0	1	0	0
Wilson's Phalarope	11	5	0	0	0	0	1
American Bittern	0	0	0	0	0.5	1	0
Broad Winged Hawk	0	0	0	0	0	1	0
Northern Harrier	0	1	1	0	0	0	0
Short-eared owl	0	0	1	0	0	0	0
Alder Flycatcher	0	0	0	0	1.5	13	5
Least Flycatcher	0	0	3	3.8	8	27	3
Marsh Wren	0	0	0.5	0	0	0	0
House Wren	0	0	0	0	0	1	4
American Robin	0	0	0	0	0.5	0	0
Gray Catbird	0	0	0	0	1	0	0
Yellow Warbler	2	2	4.5	7.8	6	43	24
Yellow-rumped Warbler	0	0	0	0	0	16.5	4
American Redstart	0	0	0	0	0	7	0
Common Yellowthroat	1.5	2.5	4	0	0	0	1
Savannah Sparrow	48	35	32	25.4	11	52	32
Clay-colored Sparrow	6	5	16	43.4	10	83	42
Le Conte's Sparrow	4	6	1	0	0.5	7	0
Lincoln's Sparrow	0	0	1	0	1	0	0
Sharp-tailed Sparrow	9	7	4	0	0	0	0
Song Sparrow	0	0	1	0	0	0	3
Vesper Sparrow	0	0	0	0	0	16	0
Rose-breasted Grosbeak	0	0	0	0	0	4	0
Red-winged Blackbird	16.5	17	0.5	0.2	2	1	4
Yellow-headed Blackbird	3	0	0	0	0	0	0

Brewer's Blackbird	0	0	1	0	1	0	0
Baltimore Oriole	0	0	0	0	0	5.5	0
Brown-headed Cowbird	0	0	0	0	2	10	1
Black-capped Chickadee	0	0	0	0.8	1	3	0
Warbling Vireo	0	0	0	0.8	0	0	0
Total	**121**	**88.5**	**71**	**82.4**	**47.5**	**299**	**125**

Acknowledgements

Bibliography

Beaverhill Bird Observatory. (2017). *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%20ce
　　nsus&f=false

Thompson, W. L. (2002). Towards reliable bird surveys: Accounting for individuals
　　present but not detected. Source: The Auk, 119(1):18-25. Published By: The
　　American Ornithologists' Union. Doi: 10.1642/0004-
　　8038(2002)119[0018:TRBSAF]2.0.CO;2