Species Inventory of Breeding Birds Within Beaverhill Natural Area and Estimations of Territories

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Abstract

Grasslands are a unique biome that provide habitat to many of Alberta's species of breeding birds. Within the Beaverhill Natural Area, a large area of grassland has been designated as a permanent study plot to record the abundance and variety of breeding birds, as well as the approximate locations of their territories. Throughout the month of June, multiple visits were made to the site, where transect lines were walked between points and the locations and behaviours of birds were recorded. Using this data, it was possible to map out the size and location of different bird territories based off vocalization density and simultaneous singing, which indicates a boundary between territories. This data was compared to previous years' data in order to understand the way these populations of birds changed over time, and how their territories shifted across years and seasons. With this information, one can better understand the ecology of the natural area and how best to conserve its many species.

Introduction

Grasslands are an incredibly unique ecosystem, boasting a unique diversity and species composition. One of the most notable species in the grasslands are birds, which may nest on or close to the ground. Many grassland species of birds are endangered due to habitat loss (Brennan & Kuvlesky, 2005); as such, it is important that populations of these species be monitored to ensure sufficient conservation, ensuring a future for these species. The goal of this study was to take inventory of the species of birds that could be found breeding within the Beaverhill Natural Area, as well as the density of breeding pairs. By recording the locations and behaviours of the birds, the location and size of territories could also be estimated.

Unfortunately, due to severe flooding that not only destroyed much of the grassland habitat but also made the study area inaccessible, the full number of planned surveys was not completed. However, using the partial data that was collected across the month of June, one can still create an inventory and attempt to parse these breeding territories.

Methods

A grid of points was established over a 500m² area, with each point spaced 50 meters apart. A GPS device was borrowed from the BBO lab and used to locate each point to ensure accuracy. At each point, a compass was used to orient towards the north. Any bird sightings or

songs were recorded at each site, along with approximate location and behaviour on a base map. Extra note was taken of any two birds singing simultaneously, as this indicates a boundary between territories.

Prior to the site flooding, two full surveys and one partial survey were completed. The first, survey A, was on June 9th; the second, survey B, on June 15th; and the third, incomplete survey, survey C, was on June 23rd. Each survey was conducted between the hours of 5am and 9am. Each time, the starting position, as well as transect direction, was changed; survey A began at point A1 and transects were walked horizontally; survey B began at point H10 and was walked horizontally; and survey C was begun at E1 and walked horizontally, concluding around point C10. After the data was collected, it was digitized, and species-specific maps were created for each recorded species. These maps showed every observation of that particular species, allowing for abundance and density across surveys to be noted. Territories were then estimated using this data.

It must also be noted that observations of tree swallows (*Tachycineta bicolor*) were not recorded, due to their breeding territories and nest locations in nest boxes already well documented within the natural area.

Results

By the end of the three surveys, 24 species of birds had been observed and documented. Of these 24, 14 were likely breeding within the natural area; 6 species were only counted once, and 5 species were observed only as flyovers. A PDF of the raw data sheets, as well as the species-specific maps for the breeding bird species, is located at the end of this report. The exclusion of a data page (for example, pages 2 and 4 of Survey C) indicates that zero observations were made in that area at that particular date, or that there were no observations of a select species in that area across the surveys.

	A	B	C	**TOTAL SIGHT-INGS**	NUMBER OF TERRITORIES DOCUMENTED	**TOTAL SIGHT-INGS 2021**
RWBB	15	47	3	**65**	12	**43**
YEWA	13	29	2	**44**	8	**66**
SASP	19	7	0	**26**	4	**15**
LEFL	10	12	0	**22**	2	**45**
CCSP	10	7	2	**19**	3	**102**

LCSP	5	9	1	**15**	2	**23**
WISN	5	8	0	**13**	1	**-**
SORA	8	5	0	**13**	2	**-**
COYE	6	6	0	**12**	3	**86**
BHCO	6	3	0	**9**	0	**16**
YHBB	0	3	4	**7**	0	**-**
ALFL	3	3	0	**6**	0	**18**
SOSP	3	2	0	**5**	1	**-**
AMRO	1	3	0	**4**	0	**-**
HOWR	0	1	2	**3**	0	**1**
VEER	3	0	0	**3**	0	**-**
BAOR	0	2	0	**2**	0	**-**
PUMA	1	1	0	**2**	0	**-**
BCCH	1	0	0	**1**	0	**-**
FRGU	1	0	0	**1**	0	**-**
MALL	1	0	0	**1**	0	**-**
MODO	0	0	1	**1**	0	**-**
SEWR	0	1	0	**1**	0	**6**
BLTE	1	0	0	**1**	0	**-**

Table 1. The number of sightings of each species across surveys A, B, and C, as well as the number of territories from each species. The rightmost column contains numbers of sightings of each species during the 2021 grassland surveys, the most recent year of which this data is available; to maintain accuracy, only the counts from the first three surveys were used. A dash represents species that were not recorded in 2021.

Discussion

Given the lack of data due to the site flooding, the territorial outlines as shown on the species sheets are vague estimates. The sample size is simply too small to adequately determine the true size and location of all territories of all birds. Nonetheless, even across the limited surveys, clear patterns have begun to emerge. Certain areas show great densities of certain

species, such as yellow warblers and least flycatchers. Instances of simultaneous singing were repeatedly recorded, providing crucial data in the mapping of territories.

Rather than focus on the details of territory number and size, another point of interest that may be more accessible with the given data would be to analyze species composition and compare it to previous years. As 2026 was a year of record rainfall (fig. 1), a higher amount of red-winged blackbirds and yellow-headed blackbirds were observed within the area than previous years, with red-winged blackbirds being the most commonly-observed species (table 1). Sora and Wilson's Snipes were also often heard in the direction of Beaverhill Lake, outside of the study area.

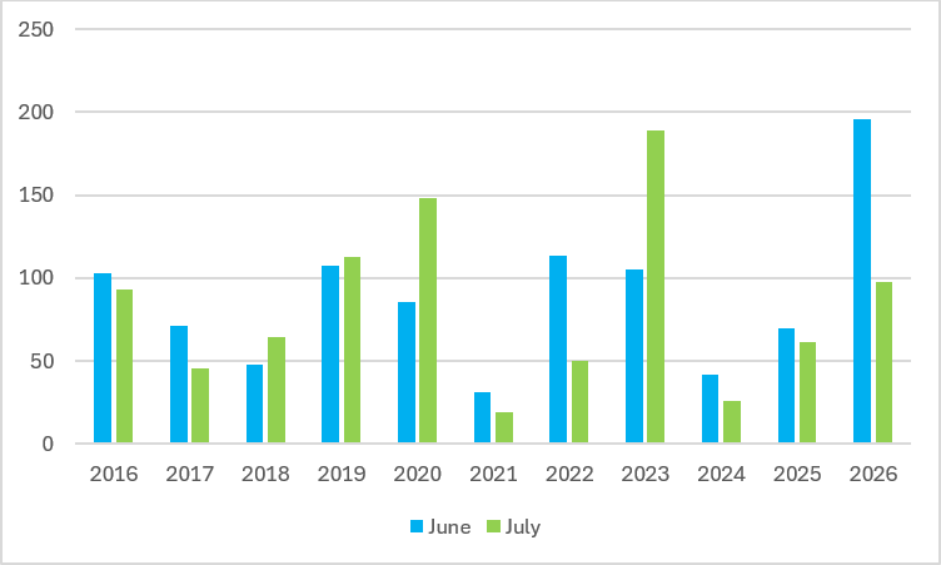

Figure 1. Annual precipitation (mm) for the months of June and July across a 10-year period. Data was collected from the Alberta government's historical weather database from the Shonts AGCM station (ACIS).

Fewer clay-coloured sparrows were observed than in 2021, perhaps due to a lack of suitable nesting conditions as a result of the heavy rainfall. These sparrows, as well as many other grassland-dwelling species of New-World sparrows, build their nests on or close to the ground, making them more susceptible to flooding than species that prefer to nest higher up or in wetland environments. (Cornell Lab of Ornithology, 2026). The extreme rainfall in June likely flooded all the ground nests resulting in a complete nesting failure for these birds this summer. Extreme rainfall is predicted by climate change models which may become more common in the future, further impacting ground nesting birds.

Having a species inventory of the Beaverhill Natural Area, especially inventories across multiple years, is a major asset regarding conservation. Understanding which species choose to breed in the natural area hints at the area's ecology, microhabitats, and food availability. By

studying birds, these other areas of ecology are also inadvertently studied, leading to a greater understanding of the ecology of the natural area and Alberta's grasslands as a whole.

Birds can be a valuable indicator species due to their higher sensitivity to pollution and disturbance than megafauna (Niemi et al., 1997); thus, being able to detect a decrease in population early can allow for action to be taken to prevent major ecosystem collapse. Knowing which regions specific birds choose for breeding habitat can also allow conservationists to be more targeted in the preservation of natural habitat. The best practice, of course, would be to consider every remaining natural area on planet Earth, as well as even urbanized areas, crucial habitat for at least some species or birds and animals, and to conserve, protect, and restore these environments to the best of our human ability. Unfortunately, this simply isn't feasible. The next best option, therefore, is to determine which environments are the most crucial; which are the birds' breeding or feeding grounds, which are the stopover sites that fuel their gruelling migrations, which are the sites that would directly correlate with a decrease in global avian population if they were to be destroyed. (Weidensaul, 2021) These surveys are the first step towards determining these crucial areas, of which the Beaverhill Bird Observatory is certainly one of them.

Conclusion

Beaverhill Natural Area is a hotspot of avian diversity and a sanctuary for breeding birds, especially grassland birds, who face threats such as habitat loss. Collecting data on a yearly basis on the species present within the natural area, as well as their breeding territories, enriches the understanding of BBO's ecology and its role in protecting potentially vulnerable species. Data can be compared across multiple years to gauge increases or decreases in population, density, and number of territories; as birds are a valuable ecosystem indicator, this system can provide environmentalists with an "early warning sign" if a drastic change is noted.

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References

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