Breeding Bird Species Diversity in an Aspen (*Populus. tremuloides)* Dominated Stand

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Introduction:

Breeding bird surveys are a relatively common method of collecting avian abundance and distribution data in a given area. The surveys can be done on a large scale, in terms of being able to conduct many surveys across a large range, with multiple surveyors. An example of such an application is the North American Breeding Bird Survey (BBS), which is an ongoing data collection underway since 1966 (Sauer et al. 2013). Studies of breeding birds by conducting a census allows for detailed information to be gathered about the density and diversity of birds in a given area or habitat type. From such data, further correlations could be made in combination with other types of data, such as species productivity. The census information can also be tied to the habitat that the census took place in, allowing for relationships between species present and habitat type to be understood.

A common type of census used to study breeding birds is using a mapping method to plot out male breeding bird territories which are indicated by clusters of registered birds from a number of visits to a given census area (Svensson 1978).

Methods:

The methodology conducted was a modified mapping census method, and conducted via six separate surveys of the study area. This involved surveying along pre-plotted grid-like transects, with various points in a letter-number coordinate system, with letters A-K on the x (east-west) axis and the number 1-10 on the y (north-south) axis, with a total area of about 0.25km^2. Each point on the grid was 50 meters apart, with the approximate intersection locations marked by flagging tape placed on either a tree or shrub, with the grid point labeled on the tape.

During each survey, the survey grid was walked through and a symbol system was used to record various observations of birds, including calls, sightings, and individuals flying (Figure 1) were recorded. With each observation the species was noted, in which a two or three letter species code was used (See Appendix for abbreviations).

After all six visits to the survey area, the pages of mapping data, which included the grid points and bird observations, were combined in order to show clusters of observations. The pages were combined by using a photo manipulation program to align scanned pages of data and then combine them so that every observation made throughout the site visits were overlaid onto the same image. Then, in order to count territories, each cluster of observations of a single species was circled and labeled as an individual territory for the bird species in the given cluster. Territories were also separated by using simultaneous observations of singing males, with the territory boundary assumed to be between the pairs of singing males. Once each of the clusters was circled and labeled, the total amount of territories for each species was counted. Once the total amount of territories for each species were recorded, the density of territories per kilometer squared was calculated for each species as well as a relative density calculated from the territories per square kilometer divided by the total density of territories for the whole study area.

The study area itself was within the boundaries of the Beaverhill Natural Area, in the vicinity of the Beaverhill Bird Observatory. Beaverhill Natural area is about 8km east of the town of Tofield, Alberta. The survey area visits were conducted between June 5th and July 25th, 2016.

Results:

The total number of territories extrapolated from the combined data mapping was about 94. The species found most commonly were the Least Flycatcher and the Warbling Vireo, with 34 and 45

territories and densities of 136 and 180 territories /km^2, respectively (Table 1). The second most common were the American Robin and the Black-capped Chickadee, with either species having about 5 territories each (20/km^2). Other species included the Downy Woodpecker (3 territories/12 /km^2) and a Baltimore/Northern Oriole as well as a Brown Headed Cowbird (1 territory = 4 /km^2).

Discussion & Conclusion:

Both the Least Flycatcher and the Warbling Vireo, the species with the largest number of territories, have a habitat preference for open deciduous forests for their breeding habitat (Cornell 2014a; Cornell 2014b), and the survey area's habitat fits this description well. The Least Flycatcher, in particular, prefers Aspen forests, especially in its western breeding range (Cornell 2014a). With future surveys, it could be expected that the number of Warbling Vireos would increase over time, due to their habitat preference preferring larger trees (Cornell 2014a).

By comparing relative density between regional density and the density reported for the survey area, evidence of this habitat preference for the species with the largest number of territories can be noted further. For the Warbling Vireo, the relative density in the study area was 0.48, which lies well within regional data ranges for deciduous forests in Alberta (Boreal Birds 2016a), which appears to show that the density in the study area is typical for the region. For the Least Flycatcher, the relative density in the study area was 0.36, but the density is lower for a deciduous forest type, but the density would fit well for a mixed forest/cropland habitat type, which could be a classification for some areas of the study area (Boreal Birds 2016b).

To conclude, this distribution of species is likely very indicative of a deciduous forest type, based on the high number of Least Flycatcher and Warbling Vireo and their habitat preferences.

Future Studies:

For future surveys, it would be worth noting the possible discrepancies that could occur over time. Using a census procedure can have inherent errors such as interpretational and observational bias (Best 1975). Observational bias stems from different survey efficiency and skill at detecting birds and is much more apparent with multiple observers for a given census area (Enemar et al. 1978, Best 1975). With interpretational bias, this has to do with the interpretation of combined data in order to quantify territories (Best 1975; Svensson 1978). A way to counter observational bias could be to have surveyors at a similar skills level, especially when comparing data collected between multiple surveyors of the given area and also by being cautious when comparing data (Best, 1975). With interpretational data, a common approach is to set a minimum number of observations for a given cluster to be considered a full territory of a given species (Svensson, 1978) as well as having a higher amount of surveys in order to have a better data set for interpretation.

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Appendix:

Table 1: Species territory counts extrapolated from combined data from all site visits, with densities (#/km^2)

Species	Number of Territories	Density (# of territories/km^2)	Proportion
Warbling Vireo	45	180	0.48
Least Flycatcher	34	136	0.36
Am. Robin	5	20	0.05
Black Capped Chickadee	5	20	0.05
Downy woodpecker	3	12	0.03
Baltimore Oriole	1	4	0.01
Brown Headed cowbird	1	4	0.01
Total	**94**	376	1.00

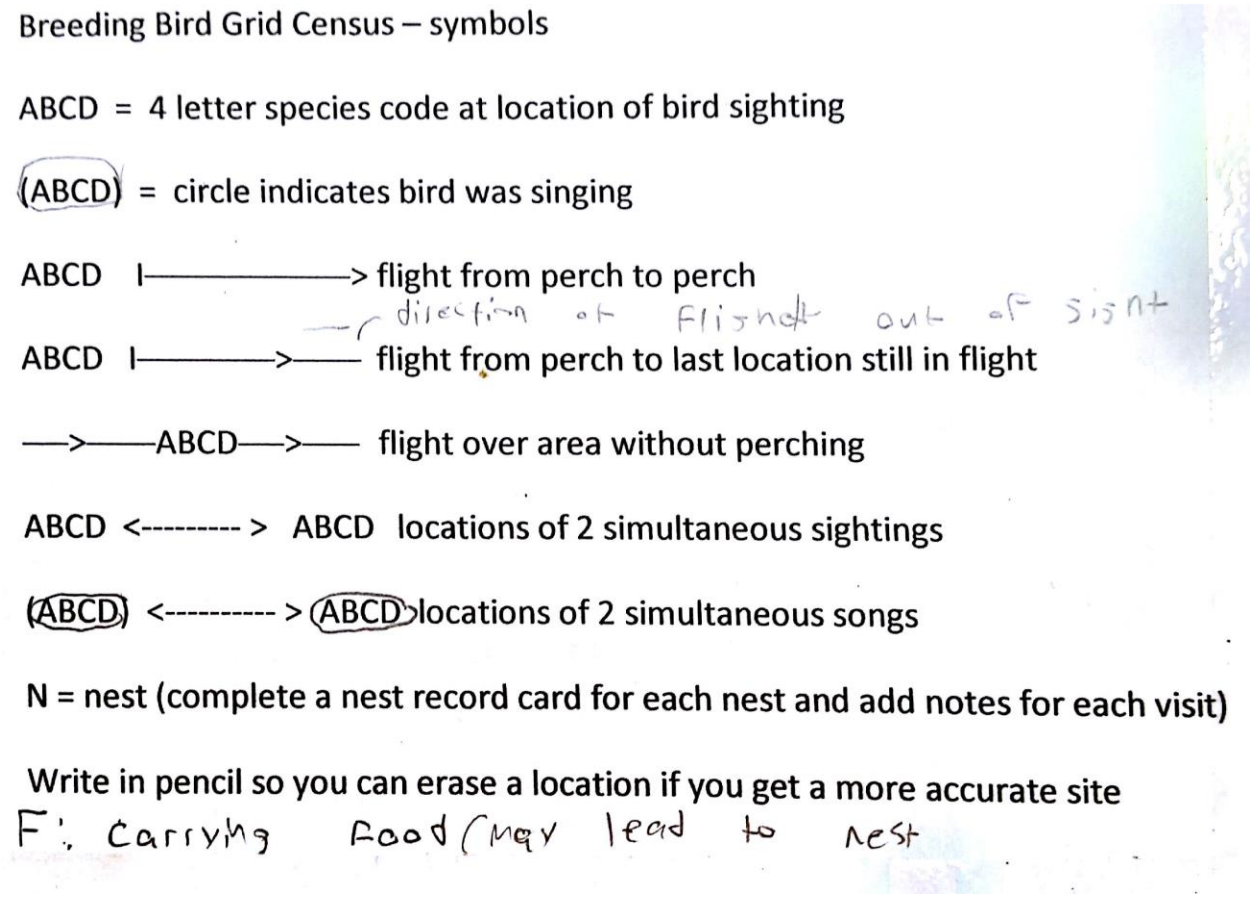

Figure 1: Symbol system used for each survey, with uncircled species codes as a sighting, the circled as a call/song heard and an arrow system for observed bird flight, with F or N letters for food and nest, respectively.

Abbreviations:

LF: Least Flycatcher

WV: Warbling Vireo

AR: American Robin

BCC: Black-Capped Chickadee

DWP: Downy Woodpecker

BHC: Brown Headed Cowbird

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