

2017 Forest Breeding Bird Survey Results at the Beaverhill Lake Natural Area

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Introduction

Protecting bird populations and habitats in natural areas requires accurate information about population densities, distributions, and trends of the resident and breeding bird species in the area. The Beaverhill Bird Observatory (BBO), located approximately 60 km southeast of Edmonton near the town of Tofield, is a bird migration monitoring observatory within the Beaverhill Lake Natural Area. The Natural Area and adjacent Beaverhill Lake were designated as an Important Bird Area (IBA) in 1997. Established in 1984 the BBO tracks changes in bird populations, migratory routes, breeding success, and survivorship, and uses a variety of techniques such as mist net captures and banding, breeding bird surveys, and nest monitoring (BBO nd.; Krikun & Holroyd 2001).

The BBO is presently monitoring breeding and nesting bird densities in two different survey grids in the Beaverhill Lake Natural Area, using a territory mapping technique, an effective and widely used censusing method for monitoring long-term breeding bird densities (Bibby et al. 2000). The grassland breeding bird grid was established and first surveyed in 1992 (Holroyd 1992), while the forest breeding bird grid (FBBG) was more recently established in 2015 (DeMoor 2015) and first surveyed in 2016 (See the FBBG report for the first survey by Dieleman 2016). This report documents the results of the 2017 census of the forest breeding bird grid.

Methods

Survey Site

The survey was conducted in a forested area of the Beaverhill Lake Natural Area, adjacent to the southwest corner of Beaverhill Lake, where the habitat is dominated by mature Trembling Aspen and Balsam Poplar trees with a fairly open understory and a partially closed canopy. The habitat transitions into willow shrubs and grasses along the northwest and southeast edges of the study site. The 25 ha survey site is marked as a grid using flagged trees at 50 m intervals, with 11 survey lines running both north-south and east-west.

Spot-mapping

Six surveys were conducted by a single observer, the author, between 04:30 and 13:00, from June 4 to July 16, 2017. Surveys began at or half an hour before sunrise, on calm rainless days, though windy conditions occurred during the last 1.5 hours of one survey and the last survey was interrupted by rain and then resumed. Surveys were completed within nine to five hours, decreasing in time as grid points were remarked and easier to find and as observer competency increased.

The territory mapping technique involved recording the species and the approximate position of every singing or visually observed bird relative to the grid points on a field visit map. The grid was walked systematically from point to point, moving at about 2 km/hr and stopping for 1 to 2 minutes at each point to listen and record observations. The species were recorded using a letter code and additional information, such as flight direction, simultaneous singing, or carrying food or nest material, were recorded using symbols. Species flying overhead above the canopy of the forest were excluded from the survey based on the assumption that they were not nesting in the forest.

Data Analysis

The territory mapping technique is based on the territorial behaviour of birds, where males mark their territories by singing and territory boundaries fall between simultaneously singing or disputing males (Bibby et al. 2000). Breeding territories were determined by transferring the separate field visit maps into single species specific maps. Each field visit was assigned a letter code and observations from each visit were marked with the letter corresponding to the visit on which it was made. Clusters of observations were visible on the combined single species maps and territory delineation was based on clusters of at least two records from two separate visits or on a record of a nest containing eggs or young. Records of simultaneously singing birds (connected by dotted lines) were automatically placed into separate clusters as these songs were assumed to be territorial, marking the boundary between territories. Recorded observations that did not form obvious clusters, or made nearby clusters too large compared to the others, were not counted as territories as they may belong to wandering males that have not yet paired with a female or established a territory, to non-breeders such as juveniles, to birds foraging outside of their nesting territories, or the territory size may be larger than the survey plot size (Bibby et al. 2000).

Results

A total of 22 bird species were observed, either visually or acoustically, within the FBBG (Table 1), though identification was primarily by song. A total of 206 breeding territories were delineated (Table 2). Least Flycatchers were the most dominant bird species detected with 104 territories, followed by

Table 1. Bird species observed, either visually or acoustically, during the breeding bird survey in the Forested Breeding Bird Grid in the Beaverhill Lake Natural Area, between June 4 to July 16, 2017.

Bird Species Detected			
1.	American Crow*	12.	Hermit Thrush
2.	American Goldfinch*	13.	House Wren
3.	American Robin	14.	Least Flycatcher
4.	Baltimore Oriole	15.	Mallard
5.	Black-capped Chickadee*	16.	Philadelphia or Red-eyed Vireo*#
6.	Brown-headed Cowbird	17.	Rose-breasted Grosbeak
7.	Brewer's Blackbird*	18.	Ruby-throated Hummingbird*
8.	Clay-colored Sparrow	19.	Ruffed Grouse
9.	Chipping Sparrow*	20.	Red-winged Blackbird*
10.	Downy Woodpecker	21.	Warbling Vireo
11.	Dark-eyed Junco*	22.	Yellow Warbler

* Species with no distinct territories; #BBO staff report most are Red-eyed Vireo

the House Wren with 29 territories. The Warbling Vireo, Yellow Warbler, and Clay-colored Sparrow were abundant, ranging from 20 to 17 territories, while the other species had 4 or fewer territories. Recorded observations for nine out of the 22 bird species detected did not form distinct clusters and were not delineated into any territories. For example, a Ruby-throated Hummingbird was only observed once during all six surveys and although Black-capped Chickadees were frequently observed, they were widely dispersed across portions of the survey grid without forming any definite patterns of clustering.

Table 2. Number of territories and densities (territories per ha) of bird species breeding and nesting in the Forested Breeding Bird Grid in the Beaverhill Lake Natural Area, surveyed between June 4 to July 16, 2017.

Species	Number of Territories	Density (Territories per ha)
American Robin	4	0.16
Baltimore Oriole	2	0.08
Brown-headed Cowbird	3	0.12
Clay-colored Sparrow	17	0.68
Downy Woodpecker	2	0.08
Hermit Thrush	1	0.04
House Wren	29	1.16
Least Flycatcher	104	4.16
Mallard	4	0.16
Rose-breasted Grosbeak	1	0.04
Ruffed Grouse	2	0.12
Warbling Vireo	20	0.80
Yellow Warbler	17	0.68
Total	206	8.24

Discussion

It is not surprising that Least Flycatchers were detected in high numbers in the FBBG as the semi open deciduous forest of the study grid is their preferred habitat and they are known for breeding in very dense clusters of territories and for aggressively chasing other bird species out of their territories (Perry et al. 2008; Tarof et al. 2008). Least Flycatchers have a very high calling frequency compared to many other bird species (Perry et al. 2008), making it difficult to identify the number of singing males or distinguish when songs were from the same or different birds, which may have resulted in inflated territory numbers. The FBBG also contains several constructed nest boxes, which readily attract House Wrens. Their tendency to sing frequently and forage in lower branches ensured they were easily observed during the survey. However, both male and female wrens sing, and during the survey songs were not differentiated by sex, therefore territories may have been overestimated as singing females were counted as males (Cornell University 2015; Johnson 2014).

Because the territory mapping method relies very heavily on song detection and displays of territorial behaviour, birds that actively forage outside of their nesting territories may result in overestimation, such as with the Clay-colored Sparrow if the same birds are counted both within and outside of their territories (Grant & Knapton 2012). Territories for more inconspicuous birds, such as the Hermit Thrush, may be underestimated as calling is more infrequent. During the survey, Hermit Thrush songs were heard only a handful of times compared to the nearly constant singing of the Least Flycatcher and the House Wren. Mallards were observed during the survey only when a female was accidentally flushed from a nest and because they were never heard calling, there may have been many unrecorded nests. Brown-headed Cowbird territories may be problematic as their habitat range is not necessarily within the forest grid but they lay their eggs in the nests of birds that do (Lowther, 1993). The Ruffed Grouse territories are uncertain as their range or territory may be much larger than the study site and no nests or territorial behaviour were ever observed. Delineating territories for birds that group diffusely, range widely, or exhibit little territorial behaviour is more difficult and prone to error than for those that group more closely, have smaller territories, or have noticeable territorial behaviour (Bibby et al. 2000).

There were no distinct territories for nine out of the 22 bird species observed within the survey grid. In some cases, this was simply due to very few observations resulting in too little data to support the delineation of territories. A Ruby-throated Hummingbird was only observed once, and both the Dark-eyed Junco and Chipping Sparrow were observed less than five times and not in all surveys. For the Philadelphia or Red-eyed Vireo (it is very difficult for inexperienced observers to differentiate the

songs of these two species, however BBO staff record primarily Red-eyed Vireo during the summer), observations were widely dispersed, with few instances of simultaneous singing, making it difficult to discern if the songs were from several birds or from the same individual moving widely throughout the area. The American Goldfinch was heard and seen flying over the canopy of the forest throughout the survey period and were observed at the feeders near the BBO lab, but clusters of records were not visible. American Goldfinches breed and nest later in the summer after the survey had concluded, and may not nest in the forest grid at all, which could explain the lack of territories (Audubon, nd).

The surveys were started from the west side of the grid during five of the six surveys, however it is recommended that breeding bird surveys using the mapping method should begin from various points throughout the survey period to avoid bias (Bibby et al. 2000). Because the surveys took longer than the standard 5-6 hours, the eastern side was surveyed into late morning or early afternoon, after peak bird activity normally subsides. As a result, it is likely that the western half of the grid is biased with higher territory density and species detections than the eastern half. For monitoring purposes and ensuring data is comparable between years, mapping surveys should be conducted with adherence to as similar a methodology as possible. This survey is conducted by student interns, possibly inexperienced in breeding bird surveys and bird identification, therefore observer competence may differ. Species detections and the number of birds calling may easily be over or under-recorded across survey years which affects the analysis of territories. Therefore, a detailed and written methodology combined with a training session should be given to FBBG interns to ensure the methodology used is as consistent as possible.

Conclusion

The breeding biology and typical territory densities are not equally understood for all bird species, therefore it is difficult to assess if all the densities seen in the FBBG are typical for this region. The FBBG is still young as it was only first surveyed in 2016. The data gathered in 2016 and 2017 provides an important baseline to characterize the breeding and nesting bird populations in the upland deciduous forest at the Beaverhill Lake Natural Area. The real value will occur as monitoring continues and future surveys are completed, allowing trends in densities and species richness to be analysed.

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