Distribution, Abundance and Status of At-Risk Birds at a Six-Acre Site Within the Upper Boileau Biodiversity Reserve, Québec

A Year-Long Research Study

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Abstract

Understanding the distribution, abundance and status of at-risk birds in any area where human impact is low is an imperative in understanding the larger ecological situation. Birds have been widely seen as reliable indicators of ecological health and there have been significant population declines in North America, especially among migratory aerial insectivores, and are escalading rapidly. As a worldwide community we must seek out those forests, grasslands and wetlands that are currently the least exploited to measure species—listed as threatened and declining.

This paper documents the research study that took place within the Upper Boileau Biodiversity Reserve—a proposed key biodiversity area. The six-acre site at La Ferme de l'Aube is indicative of the larger UBBR with mixed coniferous and deciduous woodlands, riverine and marshland habitat, open wildlands and a forest edge. During the 357-day study, 122 species were documented, the highest yearly total at the site and a 18.4% increase over the next best yearly effort. 13.9% of all birds observed during the study year are deemed either at-risk or declining.

Looking at regional gaps in bird distribution and filling them with observations will help to understand the impacts of climate change, habitat loss and human interference. Specifically focusing not only on birds currently listed as at risk, but also on those that have been deemed in

decline will give us the tools necessary to take aggressive action now so that these species do not end up on these inevitable watch lists.

Key Words

Birds, Climate Change, Ecology, Habitat, Ornithology, Species at Risk

Introduction

Understanding the distribution, abundance and status of at-risk birds in any area where human impact is low is an imperative in understanding the larger ecological situation. Birds have been widely seen as reliable indicators of ecological health (Smits et al. 2013). Since 1980 there have been significant population declines in North America, especially among migratory aerial insectivores, and are escalating rapidly (Spiller et al. 2019). It also appears that long-range migrants are declining more rapidly than short distance migrants. As birds travel further the likelihood that they will experience greater human exploitation of lands is more probable.

Specifically in Canada the two habitat types of birds that are in greatest decline are, grassland birds and aerial insectivores (NABCI Canada 2019). Wetlands and grasslands are becoming more and more imperiled, having experienced significant losses (Ray et al. 2021). In forest ecosystems, degradation has resulted in a massive decline in breeding forest dwelling species (Betts et al. 2022).

As a Canadian (and worldwide) community we need to seek out those forests, grasslands and wetlands that are currently the least exploited to measure species listed on: Canadian List of Wildlife Species at Risk (SARA: Schedule 1 2023), Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2023), and International Union for Conservation of Nature-Red List of Threatened Species (IUCN 2024). Probably more important are immediate monitoring of species that are in decline, so they do not make these inevitable lists.

Currently there is a lack of these kinds of studies in the literature. With climate change accelerating rapidly, especially in eastern Canada this study will give us a new baseline going forward.

Methods

Site Description of Upper Boileau Biodiversity Reserve (UBBR): Key Biodiversity Area Québec 45.94496, -74.812283 (link pdf)

The 1,400-hectare (3,523-acre) reserve is situated in a former glacial valley, where the receding glaciers carved out pristine mountain streams that feed into the Maskinongée river. The mountains are a mixed deciduous (roughly 75% of the total) and coniferous (roughly 25% of the total) forest that was last logged in 1950. The deciduous component is primarily made up of Aspen (trembling), Beech, Birch (white and yellow), Maple (red and sugar) and Oak (white), some are presumed to be more than 100 years old. The coniferous component is made up primarily of Fir (balsam), Hemlock (eastern), Pine (eastern white and red) and Spruce (Canadian). The Eastern White Pine were the predominant tree in the region prior to colonization—living to over 350 years old. In addition, there is a dynamic forest edge, granite bluffs, riparian wetlands with Gray Alder and wild grasslands. The biodiversity reserve is situated along approximately 2.5km of the Maskinongée river and three lakes: Couisneau, Ipperciel, and one yet to be named. Over 550 species of flora and fauna had been identified as of December 2023.

The six-acre site at La Ferme de l'Aube is indicative of the larger UBBR. To the north of the property there is a mature mixed coniferous (Balsam Fir, Canadian Spruce, Eastern White Pine and White Cedar) and deciduous (Red Maple, Sugar Maple, Trembling Aspen and White Birch) forest. It follows the forest edge and climbs high up the granite escarpment of the former

glacial mountain, where the forest is 98% deciduous (American Beech, Red Maple, Sugar Maple, White Oak, White Birch and Yellow Birch). The understory of the southern section is largely bracken Fern, blackberry, blueberry, goldenrod and raspberry. Following the terrain in the southern direction there are three crystal/granite bosque's of American Linden, Red Maple, Slippery Elm and Wild Apple and a secondary forest of Balsam Fir, Red Pine and Trembling Aspen (that has only been growing for ten years). The eastern edge is bordered by a line of choke cherries. The middle section of the property is where the non-spray, low-till veganic farm La ferme de l'Aube lies, where there is an abundance of annual and perennial plants, including vast plantings of flowers. Traveling to the west, the farm gives way to a dense Grey Alder Forest with some mature Eastern White Pines mixed in (around 75 years old). At the southern edge, a permanent creek follows the entirety of the southern border with a large stand of Eastern Hemlocks. The creek curls back northwest creating a seasonal marsh and courses its' way through a deepening canyon that is densely foliated. Between the farm and the southern creek is a vast wildland of native wildflowers dominated by Goldenrod.

Other points of interest are a man-made pond that has wild plants including narrow-leaved cattail that have been established by the avian population and a large medicinal herb and flower garden separated from the main farm. The whole farmstead, albeit anthropized, has been visualized to be an extension of the wild and as described exemplifies many habitats therein.

Methodology of the Study

At-risk birds were determined based on the assessments by the Canadian List of Wildlife Species at Risk Act (SARA Schedule 1), Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and International Union of Conservation of Nature-Red List of Threatened Species

(IUCN-Red List). Further we wished to begin tracking data on those species that are believed to be decreasing as defined by the Québec Bird Atlas 2010-2014 and IUCN-Red List data.

As often as possible (given constraints of work or inclement weather) a one kilometer one-hour walking survey was conducted that explored all the unique habitats of the site. As often as possible surveys were undertaken at the height of bird activity, at first light. During the months of January, February and March as well as the last three weeks of December two tube feeders and one platform feeder of black oil sunflower seed were installed. Some days the survey consisted of a one half to one hour feeder watching period.

Daily high and low temperatures were recorded as well as daily precipitation amounts.

Birds were counted that were seen, heard and those that flew over. High counts were determined to the best of our abilities. All results were loaded into the E-Bird database and are available to the public. (E-Bird: UBBR-La Ferme de l'Aube 2023).

We were keenly interested in establishing the status of not just at-risk species but of all birds' present (winter resident, permanent resident, summer resident/breeding, spring and/or fall migrant).

Birds have been observed at the site and recorded on E-Bird since October 2014. A total of 432 records had been entered prior to 2023. There had been 145 different bird species observed prior to 2023.

Results

During the year of 2023 we partook in a 357-day bird survey at the six-acre site La Ferme de l'Aube veganic farm within the larger Upper Boileau Biodiversity Reserve-Key Biodiversity Area (UBBR).

122 birds were observed at the La ferme de l'Aube site in 2023. This was the highest yearly total since the inception of the study area in 2014. The previous best year was 103 species. It can be determined that the 18.5% increase was obtained specifically because of the 357-day (360 observation hour) effort. In addition, seven species were recorded that had never been recorded in the study area. (Insert tables of birds seen and pdf of study month-by-month)

Specifically, the species at-risk (10) that were observed were:

Table 1: Bird species	Months observed	% of time observed	High Counts	Status
Eastern Whip-poorwill *Caprimulgus vociferus*	May-July; Sep	29%	2	Probable breeding
Olive-sided Flycatcher *Contopus cooperi*	Aug	3%	1	Migrant
Eastern-wood Pewee *Contopus virens*	June-Sep	22%	2	Probable breeding
Barn Swallow *Petrochelidon fulva*	May; July	4%	4	Possible breeding-UBBR
Wood Thrush *Hylocichla mustelina*	May-July	40%	2	Probable breeding
Evening Grosbeak *Coccothraustes vespertinus*	Jan-May; July-Aug; Nov	57%	67	Winter resident; possible breeding-UBBR?
Common Grackle *Quiscalus Quiscula*	Jan-Jul	61%	50	Probable breeding-UBBR
Cerulean Warbler *Dendroica cerulea*	Aug	3%	2	Migrant; possible breeding-UBBR?
Blackpoll Warbler *Dendroica striata*	Sep	3%	1	Migrant
Canada Warbler *Wilsonia Canadensis*	May-Aug	11%	2	Probable breeding

As important as the watch-list species were the bird species that have been determined to be declining. Those species (7) were:

Table 2: Bird species	Months Observed	% of time observed	High counts	Status
Black-billed Cuckoo *Coccyzus erythropthalmus*	Jun-aug	24%	2	Probable breeding
Great-crested Flycatcher *Myiarchus crinitus*	Jun-jul	9%	1	Possible breeding
Vesper Sparrow *Pooecetes gramineus*	Sep	3%	1	Migrant?
Baltimore Oriole *Icterus galbula*	Jun	3%	1	Migrant
Mourning Warbler *Oporornis philadelphia*	Jun-aug	25%	2	Probable breeding
Scarlet Tanager *Piranga olivacea*	Jun-aug	6%	1	Possible breeding
Rose-breasted Grosbeak *Pheucticus ludovicianus*	May-sep	79%	6	Confirmed breeding (babies)

13.9% of all birds observed during the study year are deemed either at-risk or declining.

Discussion

The warbler migration in late summer into early fall was quite impressive, with over 24 species observed during a period of five weeks from mid-August until the last week of September. The most important sighting was of a pair of Cerulean Warblers on August 18. According to ebird, this was the most northern sighting of the year, and it could be assumed that there may be a breeding location in the proximity for this Canadian endangered species.

Prior to the study it was believed that 50 bird species were possibly breeding at the La ferme de l'Aube site. With the 2023 study data that number jumped to 70.

The necessity of interlocked ecological habitats (ecological corridors) for birds cannot be overstated. While some birds may not have bred in the six-acre site, they were possibly or

probably breeding within the entirety of the UBBR. Such as Eastern Whip-poor-will who was observed flying over the veganic farm to eat insects and Barred Owl who was observed seeking rodents in the farm fields. It is also a necessary notion for migrants. The warbler migration of late summer and early fall, that also brought in flycatchers and vireos, were observed in the alders, birch and poplars every morning feeding on the abundant caterpillars gripping the underside of the leaves.

Blackpoll warblers, which have the longest southbound migration of any warbler species, must accumulate substantial fat reserves to fuel their extensive migratory flights (Morris et al. 2016), as do all the other warbler species that winter in central and south America. The caterpillars that they were feeding in would satisfy nicely.

Some watch list species that had historically occurred were absent in 2023. Including Bobolink *Dolichonyx oryzivorus*, Eastern Meadowlark *Sturnella magna* and Rusty Blackbird *Euphagus carolinus*. In addition, numbers and abundance of Eastern whip-poor-will, Barn Swallow and Wood Thrush was low compared to previous years, with more limited data. Indicating that like the rest of Canada there appears to be declines in grassland birds and aerial insectivores.

Conclusion

This study changes what could be the new baseline in ornithological observation for a particular site. While it is not always feasible to effectuate a 350+ day per year survey, looking at regional gaps in the data and filling them with observations will help to understand the impacts of climate change, habitat loss and human interference. Specifically focusing, not only on birds currently listed as at risk, but also on those that have been deemed in decline (models) will give us the tools necessary to take aggressive action now so that these species do not end up on these

inevitable watch lists. In addition, studies during not only spring migration, but fall migration can give site managers powerful tools in understanding the availability of food sources and re-wild accordingly.

To achieve the goal of protecting 30% of all lands and oceans by 2030 it is imperative to make comprehensive assessments. Region-by-region we need to discern those areas most important, not merely species-by-species but with intact, low-human impact, ecological habitats. Furthermore, money needs to be shifted in the public sector for the surveys, and vast lands of low human population density with ecological variance should be protected without delay.

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