2011 Nova Scotia Habitat Conservation Fund

Final report on activities.

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(1) Project goal and objectives

To develop an index for comparing habitat use by migratory passerines that employs radar and acoustic sampling. To use the method to compare the relative importance of habitat for migrant passerines at a site in the Gaspereau Valley, Nova Scotia.

(2) An outline of the work completed

Two radars were run continuously from early September through to late October at two sites in the Gaspereau Valley, Nova Scotia (Figure 1). At each site we also conducted a simple transect census of areas within 1-2 km of each radar, on 1-3 mornings per week. Two acoustic recording devices were also deployed at each location; recordings were made overnight and during the early morning.

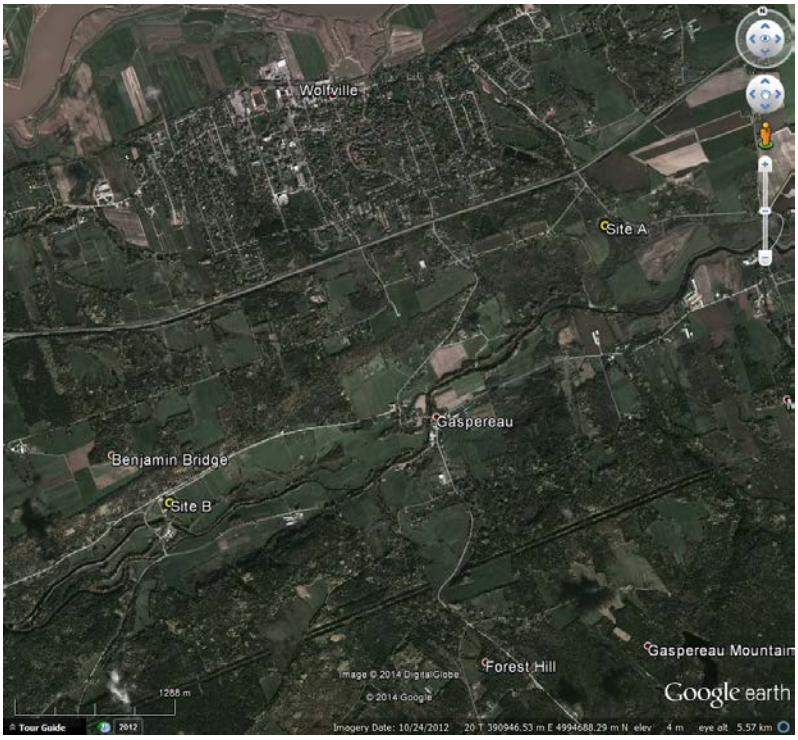

Figure 1. Location of two radar study sites in the Gaspereau Valley of Nova Scotia.

A) Radar data.

All radar data from Site A were processed to extract bird targets. Five nights of intense migration were chosen for fuller analysis (24, 25, 26, 27 and 28 September). Radar data from Site B were problematic, in that there was considerable interference from a nearby barn roof, and from vegetation on the far side of the valley.

A full habitat delineation of site A was completed. Habitats were classified as one for seven types: House, vineyard, scrub, orchard, hedgerow, forest and field by delineating those categories on a Google Earth image, and then ground-truthing.

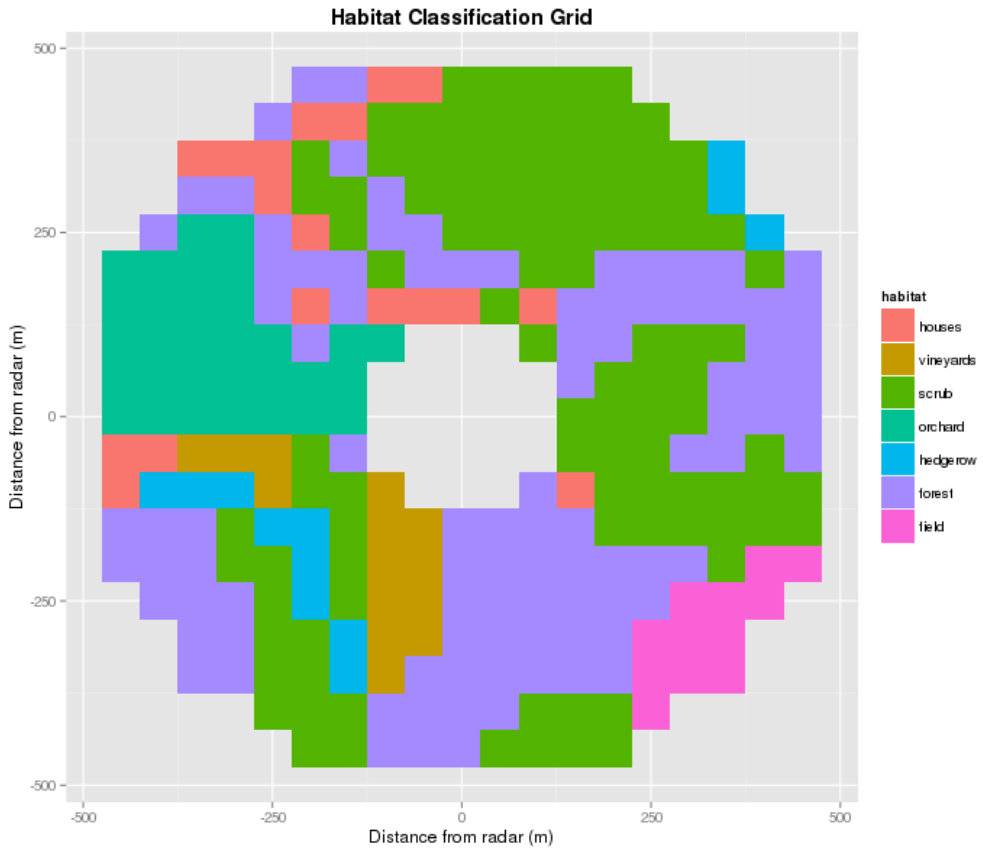

Figure 1. Habitat classifications. The spatial distribution of different habitats in our study area. Each grid square is 50 x 50 m and was classified visually (from a google maps image). A portion of these assessments were verified by ground-truthing.

Radar data was processed and divided into 5-20 minutes periods (1) 20 minutes pre-civil dawn, 2) 20 minutes post-civil dawn, 3) 80 minutes post-civil dawn, 4) 20 minutes pre-civil dusk, 5) 20 minutes post civil dusk. Each targets detected by the radar in each period was then associated with the underlying habitat.

For each time period and date, we then assessed the strength of the correlation between observed bird targets and the underlying habitat type.

B) Acoustic and transect data. Acoustic and transect data have been partially processed and archived for future use. Our original intent was to correlate these acoustic data with the radar data, but the quality of the radar data was insufficient to make these comparisons worthwhile (see 'future research' section).

(3) Results

The highest predicted frequency of targets (blips) was around the orchard, house and hedgerow habitats during time periods 2 and 3 (20 minutes post civil dawn and 80 minutes post civil dawn. Correlations were low at other times.

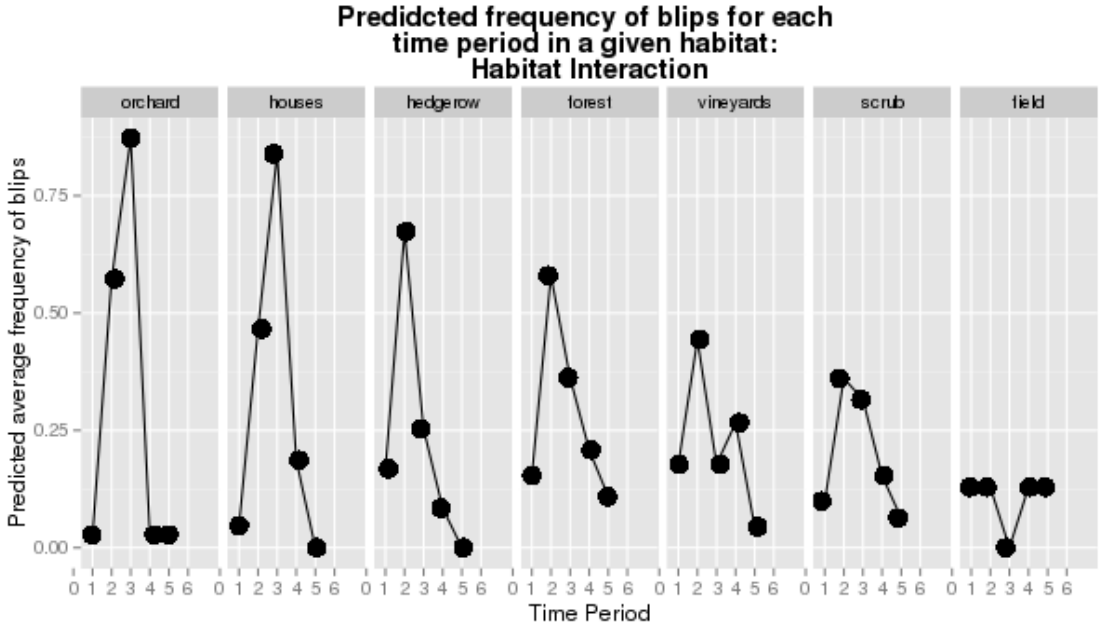

Figure 2. Predicted density frequency of blips for each time period in a given habitat: Activity level. The predicted frequency of targets in each cell for each habitat in a given time period. Predicted values were obtained from a fitted model of counts by distance and habitat x time period, fixing distance at 350 m from the radar.

The results show that the radar can indeed be used for correlations of activity with habitat.

(4) Assessment of achievements and lessons learned, measured against the project goals and objectives

Our objective of testing the radar as a means for habitat assessment of inland sites was partially met. We did show positive correlations with several habitat types, showing that we were able to

assess that variance in the use of on-the-ground habitat could be detected by the radar. Due to funding constraints that did not allow for a travel budget, we chose local sites that in retrospect were too complex to allow for a simple interpretation of the results. Further, the considerable clutter at both sites (at Site B the clutter made much of the data unusable) compromised our ability to extract targets from the background at very low altitudes.

The student doing the work did not make use of the ground-surveys or acoustic data in her work. While part of the original objectives, the quality of the radar data (in particular, our ability to associate targets with specific points of take-off and landing) is not as high as we had originally hoped. Furthermore, the complexity of the underlying habitat at the chosen site makes it unlikely that more in-depth analyses would be fruitful.

Future studies of habitat use of inland sites are planned. These, combined with improved radar target detection algorithms, should allow for better discrimination of targets from the background which in turn will allow us to repeat this experiment.

We believe that repeating the experiment in a much simpler environment (e.g. with only two basic types of habitat) combined with the improved target detection algorithms, should help to simplify the interpretation of the results.

(5) **Recommendations for follow-up steps to the project**

None specific to this project (beyond those detailed under future research).

Summary of the study

The importance of non-coastal habitats for migratory birds is poorly understood. Counts of birds on the ground are often used to measure habitat use by migrating birds but this method is time-consuming. The objective of this study was to develop a method to assess the use of habitat by migratory birds during stopover. We used a small marine radar to scan the air above a site in the Gaspereau Valley that had a variety of different underlying habitats. We selected five nights of intense migration during the fall of 2011 for further analysis. From each night we I looked closely at separate 20 minute time periods corresponding to times when songbirds were likely arriving and departing: immediately before and after sunrise, immediately before and after sunset, and 80 minutes after sunrise. We then used statistical models to show that houses and hedgerows were associated with the highest bird densities, during the period just after sunrise. Using radar for assessing habitat use by migratory passerines shows promise for land managers to remotely assess site importance.

Funding Support

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