Habitat selection, population size and breeding success of Bobolink and Eastern Meadowlark in various habitats

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Ontario

Lennox & Addington Stewardship Council — Caring for the Land Together

Landowners of Amherst Island

Kingston Field Naturalists

Frontenac Stewardship Foundation

association to protect Amherst Island

Nature Conservancy Canada

Executive Summary

Amherst Island is situated in Lake Ontario, southwest of Kingston and across the channel from Bath. Amherst Island covers 59 square kilometres. Most of the Island is undulating meadow and pasture. Remnants of mixed deciduous forest and other habitats also remain. Cattle and sheep farming are prominent lifestyles in this rural community.

Amherst Island lends itself perfectly to a study of the grassland birds that dwell in its pastures and hayfields. Based on the Breeding Bird Atlas point count data, Lennox & Addington County has a mean density of 1.171 for Bobolink and 0.213 for Eastern Meadowlark, ranking first in Bobolink density in all of Ontario and eleventh in Eastern Meadowlark density (Cadman et al., 2007).

By describing priority habitats and regions for conservation, and by increasing public awareness of the two species and their habitat, we are supporting some of the goals laid out in the 2013 Recovery Strategy for both species (McCracken et al., 2013).

Six Project Objectives

1. Measurement of the impact of different start times for haying on the breeding success of the Bobolink and Eastern Meadowlark.

2. Comparison of the two grazing schemes currently common on Amherst Island, which include low density cattle grazing and high density sheep grazing. Their relative impact can be measured on the breeding success of the Bobolink and Eastern Meadowlark.

3. Comparison of existing 2012/13 data to the 2014/15 data in terms of population changes.

4. Comparison of habitat use for both species according to the data from 119 point count stations located on four different habitat types on Amherst Island, Wolfe Island and Kingston.

5. Suggestion of optimal surveying techniques for Bobolink and Eastern Meadowlark.

6. Use of this baseline information to measure the impact of road widening and installation of wind turbines on the critical habitat for species.

Results for Hayfield Habitat

Climate and environmental factors result in the common practice on Amherst Island of starting to mow hayfields after July 1. Most nests of both species are empty by this date and the offspring have fledged. This provides good nest success for both bird species.

Due to the later hay cutting dates, hayfields on Amherst Island are providing critical habitat for Bobolink and Eastern Meadowlark.

The high breeding success rates of 57.5% for Bobolink and 81.8% for Eastern Meadowlark in hayfields are excellent indicators of a healthy environment where grassland birds and farming can coexist.

Results for Pasture Habitat

Grazing management systems vary from a simple single rotational plan for cattle to an intensive rotational system for sheep. Due to the sustainable grazing program used on the Island, the nest success for both bird species was excellent.

The low stocking rates – an average stocking density of one cow/ha (hectare) – in cattle pastures on Amherst Island are providing critical habitat for Bobolink and Eastern Meadowlark.

The high breeding success rates of 58.6% for Bobolink and 81.25% for Eastern Meadowlark in pastures are excellent indicators of a healthy environment where grassland birds and farming can coexist.

Population Changes

There was a decline in the Bobolink population of about 36.1 % in four years or 12.0 % annually. In the Eastern Meadowlark population, the decline was similar: about 33% in four years or 11.0 % annually. Drought conditions in Eastern Ontario may help account for the decline, especially in the case of the Bobolink.

Despite the population declines reported for Amherst Island in this study, the Bobolink population is still very high compared to other areas in Ontario.

Comparing Habitat Use

Habitats studied for the two bird species included pastures, hayfields, old fields and shrub/thicket habitats. From this data, it appears Eastern Meadowlark are more tolerant to shrub encroachment than Bobolink. Old fields are much better tolerated by Bobolink compared to Eastern Meadowlark.

For additional case studies, see page 21 of this report.

Final Report

Introduction

Lennox and Addington Landcare is a community based volunteer organization. Our mission is to develop ways to meet the stewardship needs of our community, develop partnerships that endorse the stewardship ethic, and to share current information with the community about healthy, sustainable practices. We wished to embark on the SAR Grassland Birds project to help meet all of these goals.

Amherst Island is a unique environment, with a large percentage of grasslands, hayfields and pastures. This is essential habitat for many birds, including species of threatened grassland birds. In addition, we already had firm relationships with many landowners, enabling good access to their properties.

Prior to the current project, Lennox and Addington Landcare, along with the Kingston Field Naturalists, completed two years of point counts for Bobolinks, Meadowlarks and Barn Swallows on Amherst Island. This work allowed us to ascertain that there is indeed a significant population of these birds on the island.

Our intent was to obtain more data on habitat use and population size changes to strengthen the validity of the two-year data set. This would add nesting success information to the data being collected. Complete, scientific data collection is essential to fill the knowledge gaps about threatened grassland birds. We also realize it is vital to protect habitats in order to help them.

We wanted to help determine the impact of different land management strategies on the nesting success, to be sure that advice and regulations for farmers are appropriate and fact-based. Farmers and landowners need to understand the habitat needs and nesting habits of the birds to be able to adapt their schedules when possible. This will enable improved land management and policy on these species.

As education is a big part of our mandate, we wished to provide public workshops to educate local people on threatened species, habitat, and the local context. In our first workshop on November 19, 2015, the people of Amherst Island were very receptive to our presentation. There was a good discussion of the importance of grassland birds and their partcipation in helping grassland birds.

Project Objective

1. To provide information on how the different start times of haying impact the breeding success of Bobolink and Eastern Meadowlark.

Study sites: Amherst Island: Hayfields
Length of Study: two years

Farmers maintained hayfields for the purpose of providing additional feed to their mostly grass-fed beef cattle and sheep.

Method

Research was conducted on eight hayfields with a total acreage of 104.3 ha. All hayfields were in a rectangular configuration and between 2.9 ha (7.2 acres) and 35 ha (87 acres) in size. Hayfields were visited by Kurt Hennige between May 20 and July 10, 2014 and between May 15 and July 13, 2015. Most visits were from 5 am to 10 am and from 5 pm to 9 pm, however, during the last two weeks in June and early July, many visits at other times of day were necessary to confirm breeding success. It took a minimum of 10 visits annually to each site to record all pairs and breeding success. This was achieved by recording all nesting pairs from hours of observations using trees, hedgerows and fences for screening or standing at the perimeters of properties without disturbing the birds, using binoculars or scope.

Territorial males were only considered to be part of a breeding pair when no females were seen, but there was evidence of several weeks of occupancy, and the recorder observed the male feeding fledglings or leaving the nest with the fecal sac. Clearly, the easiest way to confirm successful breeding was by observing pairs feeding recently fledged young. To confirm a successful nesting by a pair, at least one fledgling needed to be observed either near the nest or within a few days of leaving the nest.

Determining breeding success for Bobolink and Eastern Meadowlark by remote nest monitoring is a very labour-intensive approach, and many causes of failure could not be determined by this method. However, counts of fledged young in particular helped to determine breeding success in these hayfields as well as in pastures.

Results

Over the two-year period, 2014-15, only two fields out of eight were cut before July 1 in 2014, and none were cut before July 1 in 2015. This was done without considering financial incentives or grassland bird conservation. It was due to a slower growth of vegetation, because the cold water of Lake Ontario surrounding Amherst Island prevents the faster growth seen on the mainland. There are other reasons for the common practice on Amherst Island of starting to mow after July 1. With only one dairy

farm on the Island, most hay is cut to feed beef cattle, which have lower crude protein requirements than dairy cattle. Later hay cut dates have fewer negative financial effects on beef cattle farmers than they would on dairy farmers. Additionally some farms have a large hay acreage but limited available harvesting equipment, partly due to size restrictions on the ferry.

Nest Success

A total of 97 nesting Bobolink pairs were found, whereas the totals by year are 49 pairs in 2014 and 48 pairs in 2015.

From the 98 Bobolink pairs monitored, 56 pairs (57.5%) were successful (producing at least one fledgling), and 41 pairs failed.

A total of 11 Eastern Meadowlark pairs were found nesting in the hayfields, 5 pairs in 2014 and 6 pairs in 2015. From the 11 pairs monitored, 9 pairs (81.8) % were successful (producing at least one fledgling) and 2 pairs failed.

Nest Failure

Predation accounted for the failure of 3 Bobolink pairs, the reasons for 35 failures are unknown, and 3 pairs were mowed during hay cutting. The recovery of some female feathers indicates the incubating female was also killed in the process. There is strong evidence that white-tailed deer took eggs and/or fledgling Bobolinks.

A total of three nest failures by Eastern Meadowlark were observed. The first was in 2014, when a hayfield was converted to growing fruit in late May and one pair left the area. In 2015, one pair left the area in mid-May for reasons unknown, and in another field, a second nest from the same pair was affected by mowing on July 3rd.

Breeding Success

The above high breeding success rates of 57.5% for Bobolink and 81.8% for Eastern Meadowlark in hayfields are excellent indicators of a healthy environment where grassland birds and farming can coexist.

Although sometimes calculated differently among studies and not always strictly comparable, regional examples of nest success rates are as follows: uncut eastern hayfields of Ontario/Quebec: 43.0%, n = 53 (Frei, 2009) and uncut eastern hayfields in New York: 48.3%, n = 91 (Norment et al., 2010). These regional differences appear to largely stem from differential rates of nest predation, which can sometimes be high (e.g., Kerns et al., 2010).

The large open fields with few woodland edges allow lower predation rates. Due to this and the later hay cutting dates, hayfields on Amherst Island are providing critical habitat for Bobolink and Eastern Meadowlark.

Delaying hay harvest until birds have finished breeding clearly benefits grassland bird reproduction (Bollinger et al., 1990; Herkert,1997), but losses in hay nutritional quality for maintaining livestock are a concern for farmers (Nocera et al., 2005).

In addition, rates of grass maturation and the timing of peak fledging periods for nesting birds may vary regionally, making it difficult to provide broad-scale conservation and management recommendations.

Project Objective

2. To provide information on how the cattle and sheep grazing regimes on Amherst Island impact the reproductive success of Bobolink and Eastern Meadowlark

Study sites: Amherst Island: Pastures
Length of Study: two years

About 60% of all grassland habitat on Amherst Island is used for cattle and sheep grazing. While the local sheep famers use most of their land for pasture, the majority of beef cattle are brought by mid-May via ferry to the Island by dairy and beef cattle farmers in the Napanee area.

Method

Research was conducted on seven pastures with a total acreage of 274.5 ha. All pastures were in a rectangular configuration and between 16.2 ha (40 acres) and 56 ha (140 acres) in size. Pastures were visited by Hennige between May 16 and July 16, 2014 and between May 15 and July 19, 2015. It took a minimum of eight visits annually to each site to record all pairs and breeding success.

Please see Method (for hayfields) on page 5 for details on methodology, essentially the same for hayfields and pastures.

Results

Grazing management systems vary based on the farmers' discretion. Most local beef cattle and dairy farmers can manage their pasture area using a simple grazing management plan, which consists of large paddocks with a low density of cattle grazed for long periods of time. The cattle are rotated through the paddocks once over the grazing season.

Intensive rotational grazing systems contain smaller paddocks that are grazed for short periods of time. The local sheep farmers often use this system, where a high density of

sheep are rotated frequently, resulting in each individual paddock being grazed more than once during the grazing season.

Nest success

A total of 210 nesting Bobolink pairs were found; the totals by year are 109 pairs in 2014 and 101 pairs in 2015.

From the 210 Bobolink pairs monitored, 126 pairs (60.0%) were successful (producing at least one fledgling), and 84 pairs failed.

A total of 16 Eastern Meadowlark pairs were found nesting in the pastures, 10 pairs in 2014 and 6 pairs in 2015. From the 16 pairs monitored, 13 pairs (81.25%) were successful (producing at least one fledgling) and 3 pairs failed.

Nest Failure

Predation accounted for the failure of 4 Bobolink pairs, the reasons for 76 failures are unknown, and 4 pairs were trampled by grazers. A suspected cause was trampling by cows. In one incident, a fledgling with a broken wing was noticed after cattle ran through the grass. There were at least two confirmed kills of fledglings by house cats.

There were three partial nest failures by Eastern Meadowlark in 2014. The reason for one failure is unknown, both others are nest predation by house cats. A cat was observed killing one fledgling in one nest, and a different cat was seen near another nest several times. No nest failure was observed in 2015.

Breeding Success

The high breeding success rates of 60.0% for Bobolink and 81.25% for Eastern Meadowlark in pastures are excellent indicators of a healthy environment where grassland birds and farming can coexist.

The large open pastures with few woodland edges allow lower predation rates. Due to this and the low stocking rates – an average stocking density of one cow/ha – cattle pastures on Amherst Island are providing critical habitat for Bobolink and Eastern Meadowlark.

Cattle grazing at low to moderate densities leads to a more diversified vegetation structure within a pasture (Baker and Guthery, 1990; Bock et al., 1993; Powell, 2008), which can be associated with greater numbers of successfully nesting Bobolinks and Eastern Meadowlarks (Bock et al., 1993; Bélanger and Picard, 1999; Renfrew and Ribic, 2001).

However, overgrazing due to high stocking rates leaves grass under 10 cm tall and can severely alter the structure and composition of the vegetation. (Baker and Guthery,

1990; Bock et al., 1993; Scheiman et al., 2007) and even alter the insect food supply (Quinn and Walgenbach, 1990), degrading habitat suitability for Bobolink and Eastern Meadowlark. Likewise, “management-intensive rotational grazing” can result in trampled nests due to high stocking rates and/or frequent disturbance within a given paddock (Temple et al., 1999; Renfrew et al., 2005; Perlut and Strong, 2011).

For more support data on the breeding success factors of Bobolink and Eastern Meadowlark on Amherst Island, please refer to the Appendix for the Tables.

Project Objective

3. Compare existing 2012/13 data to the 2014/15 data from the 91 point counts and show population changes

Study sites: Amherst Island
Length of Study: four years
Methods: 91 point counts *and* Pair/nest monitoring

Method: 91 point counts

The Amherst Island Open Country Breeding Bird Habitat is known to provide critical habitat for several threatened species. Starting in June 2012, Kurt Hennige surveyed four routes (East, Centre, Northwest and Southwest) around the island observing and recording the presence of these species from a total of 64 point count stations spread along public roads. During the 2013-2015 period, four yearly surveys on the 91 point count stations were undertaken by five different members of the Kingston Field Naturalists. Two surveys were in May and two in June, observing for five minutes at each station, recording the numbers of Bobolinks and Meadowlarks within 200 metres. Point counts were conducted between sunrise and 10:00 am, weather permitting (no precipitation and wind speed <25 kilometres/hour).

Of these 64 point count stations, 27 had suitable habitat on both sides of the road. In this case, two "stations" were defined at that point and separate observations were made on each side of the road. At the other 37 points, there was suitable habitat on just one side of the road, so only one station was defined. Each point count station was given a number and the one or two stations at that point were given a direction, depending on the orientation of the road. Thus the station on the east side of the fifth point count station of the East route would be named EA 5-E. There were a total of 91 point count stations (27 x 2 + 37 = 91). For analyzing the population size and breeding density data, the maximum number of Bobolink and Eastern Meadowlark observed only during the late May or early June survey dates within the 200 m circle, were included.

The map and table below show the location of all 91 roadside point count stations. The colours indicating the different Land Uses and their total numbers are explained.

Figure 1: Map of point count stations at Lemoine Point

Hayfield, in use, HF: colour pink, 33 stations
Hayfield, abandoned, HA: colour salmon, 3 stations
Pasture, marginal, PM: colour bright green, 31 stations
Pasture, intensively grazed, PI: colour light blue, 12 stations
Pasture, abandoned, PA: colour light brown, 4 stations
Shrub/Thickets, >50%, SM: colour brown, 3 stations
Shrub/Thickets, <50%, SL: colour black, 5 stations

Results

The bar graph below shows a 23.0 % drop in the Bobolink population from 2012 to 2013, and 8.5 % and 9.0 % in the following years. It shows an 8.9% drop in the Eastern Meadowlark population from 2012 to 2013, and 20.7% and 7.3% in the following years.

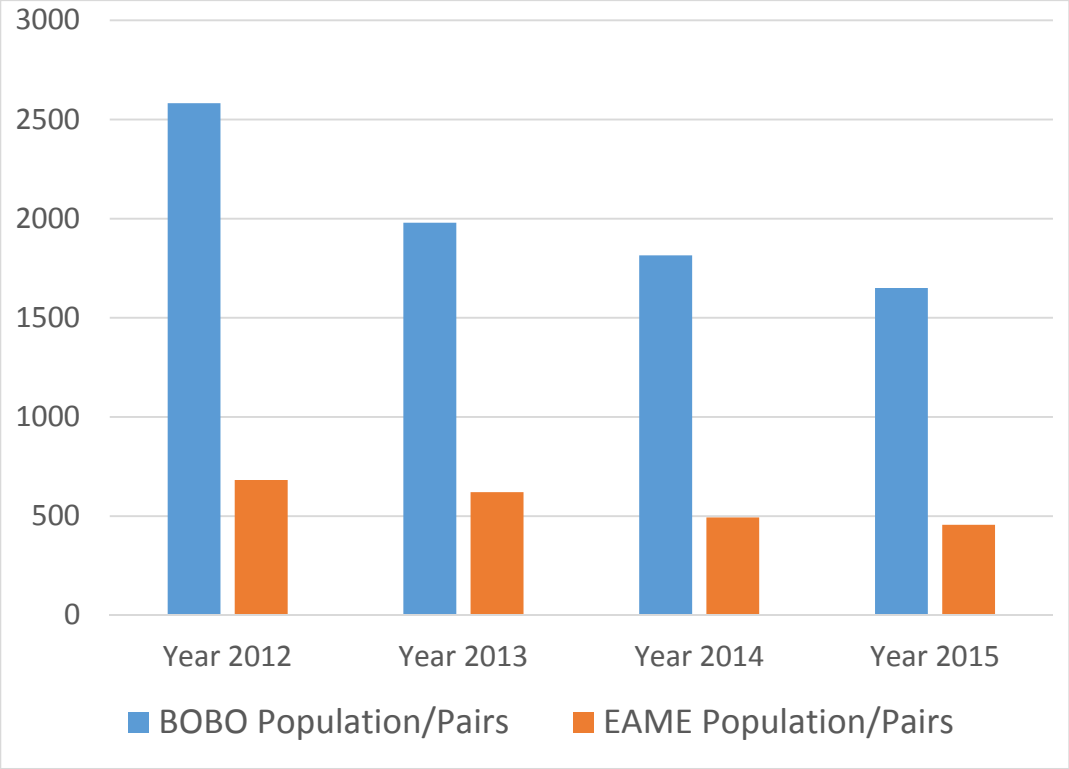

Figure 2: BOBO and EAME population in pairs

Bobolink

The decline of about 36.1% in four years or 12.0% annually is alarming especially when less than 5% of the point count stations were turned over to grain and oilseed crops (e.g., wheat, corn and soybean): often recognized as the primary threats to their populations (McCracken et al, 2013). Unfortunately, other recent studies in Ontario, such as the Norfolk County Study undertaken in 2012 by Bird Studies Canada, also reported a 58.6% decline in 10 years or 5.9% annually. In this study, habitat turnover from hayfields/pasture to row crops was the primary reason for the decline. (Richmond et al, 2014).

With little habitat turnover during the study period and excellent breeding success as shown above, why are we seeing this decline? While not all reasons are known for the decline, the largest 23.5% drop from 2012 to 2013 is accountable.

Citing the MacDonald study (Macdonald, 2014) from the Renfrew area: In 2012, Eastern Ontario experienced extreme heat and low rainfall amounts (151.4 mm) causing drought-like conditions (Drought in Central, Eastern Canada, 2012, Statistics Canada, 2012). Because of the drought conditions, hayfields and pastures had a low amount of regrowth after cutting and grazing events. With lack of regrowth, pastures and hayfields

were left with less biomass at the end of the grazing and haying season than in non-drought years, which led to significantly shorter vegetation, reduced live vegetation cover, and higher amounts of bare ground and litter cover in mid-May of 2013.

MacDonald's results showed that the mean abundance per point count circle dropped by 42% between 2012 and 2013 in hayfields and by 50% in pastures.

Eastern Meadowlark

The decline in Eastern Meadowlark of about 33.0% in four years or 11.0% annually is similar to the above decline seen in Bobolink. The Norfolk study also showed an annual 7.4% decline in Eastern Meadowlark. Interestingly, the largest drop (20.6%) occurred in 2013 to 2014, one year after it occurred in Bobolink, so it is unclear if the drought in Eastern Ontario affected the Eastern Meadowlark the same as it did the Bobolink.

Year	BOBO Breeding Density Pair/10ha	BOBO Population size/Pairs	BOBO per station and occupancy rate (n=91)	EAME Breeding Density Pair/10ha	EAME Population size/Pairs	EAME per station and occupancy rate (n=91)
2012	7.4	2582.1	89 (97.8%)	1.96	682.12	69 (75.82%)
2013	5.7	1979.2	88 (96.7%)	1.79	621.18	70 (76.92%)
2014	5.2	1814.8	79 (86.8%)	1.42	493.29	60 (65.93%)
2015	4.7	1650.2	81 (89.0%)	1.31	456.75	60 (65.93%)

Table 1: Additional Information on Breeding Density and Occupancy Rate

Despite the 36.1% population decline for Bobolink and 33% for Eastern Meadowlark, the occupancy rate for Bobolink: from a very high rate of 97.8% in 2012, dropped only to 89% in 2015 and the Eastern Meadowlark occupancy rate dropped only from 75.8% in 2012 to 65.9% in 2015, indicating that the large amount of available habitat is still occupied.

Comparing Amherst Island data to other Ontario data:

Despite the population declines reported for Amherst Island in this study, the Bobolink population is still very high compared to other areas in Ontario. In *Birds of the Kingston Region*, Dr. Weir reported the breeding population of Bobolinks during the 2001-2005 Breeding Bird Atlas period (Weir, 2008). The 1,650 pairs of Bobolinks represent 6.3%,

and the 456 pairs of Eastern Meadowlarks represent about 10% of the Kingston area, but the suitable area of Amherst Island – 59.18 km^2 – only accounts for 0.4% of Breeding Bird Atlas area 21 (including Kingston), which equals 13,000 km^2.

Further, from analyzing the mean densities of BOBO and EAME in Ontario municipalities, based on atlas point count data, it indicates that the Lennox & Addington County mean density is 1.171 for Bobolink and 0.213 for Eastern Meadowlark, ranking first in Bobolink density in all of Ontario and eleventh for Eastern Meadowlark density. The second highest ranking county for Bobolink mean density is Dufferin with 0.908, which is 22.5% lower. The county adjacent to L&A: Frontenac County, ranked ninth in Bobolink mean density at 0.61, which is 48% lower.

Alternative Population Data

Comparison of the data collected for 2014/2015 from the 91 point counts method (described on page 9) and the pair/nest monitoring method (described below).

Table 2 below shows the difference in abundance of Bobolinks per 10 ha by comparing the point count data to the pair/nest monitoring data.

The results show lower Bobolink abundance by 19.9% in 2014 and 19.8% in 2015 using the pair/nest monitoring and comparing it to the point count study. The results also show a smaller population size.

Method: pair/nest monitoring

While the nest monitoring study provided us detailed information on breeding success in pastures and hayfields (regarding Objectives 1 and 2), it also provided us with data on abundance and therefore, population size. This was achieved by recording all nesting pairs and all territorial males, from hours of observations using trees and fences for screening or standing at the perimeters of properties without disturbing the birds, using the binoculars or scope.

The area covered by all properties was 25% larger than that covered by the point count method. While this method requires significantly more time than the point count method, it does provide more reliable abundance data, important for calculating population size.

Year	Method used and area covered	BOBO Breeding Density Pair/10ha	BOBO per station and occupancy rate (n=91)	BOBO Population size/Pairs. Amherst Island
2014	Pair /Nest monitoring study 379.1 ha	4.2	N/A	1461.6
2015	Pair /Nest monitoring study 379.1 ha	3.8	N/A	1322.4
2014	Point count (half) stations covering 285.74 ha	5.2	79 (86.8%)	1814.8
2015	Point count (half) stations covering 285.74 ha	4.7	81 (89.0%)	1650.2

Table 2: Comparison of Methods on Breeding Density, Occupancy & Population

Project Objective

4. Data from 119 point count stations located on four different habitat types on Amherst and Wolfe Islands and Kingston to provide information on habitat use for both species

Study sites: Amherst Island, Wolfe Island and Kingston
Length of Study: two years
Method: 119 point counts

Results

After the first two years (2012/13) of 91 roadside point counts on Amherst Island, it became apparent that if we wish to compare habitat use in all habitats used by Bobolink and Eastern Meadowlark, then off-road habitat is required to demonstrate missing habitat types. For the next two years (2014/15), we added an additional 15 point count stations on Amherst Island, 6 point count stations on Wolfe Island (at Bear Point), and 7 point count stations in Kingston (at Lemoine Point).

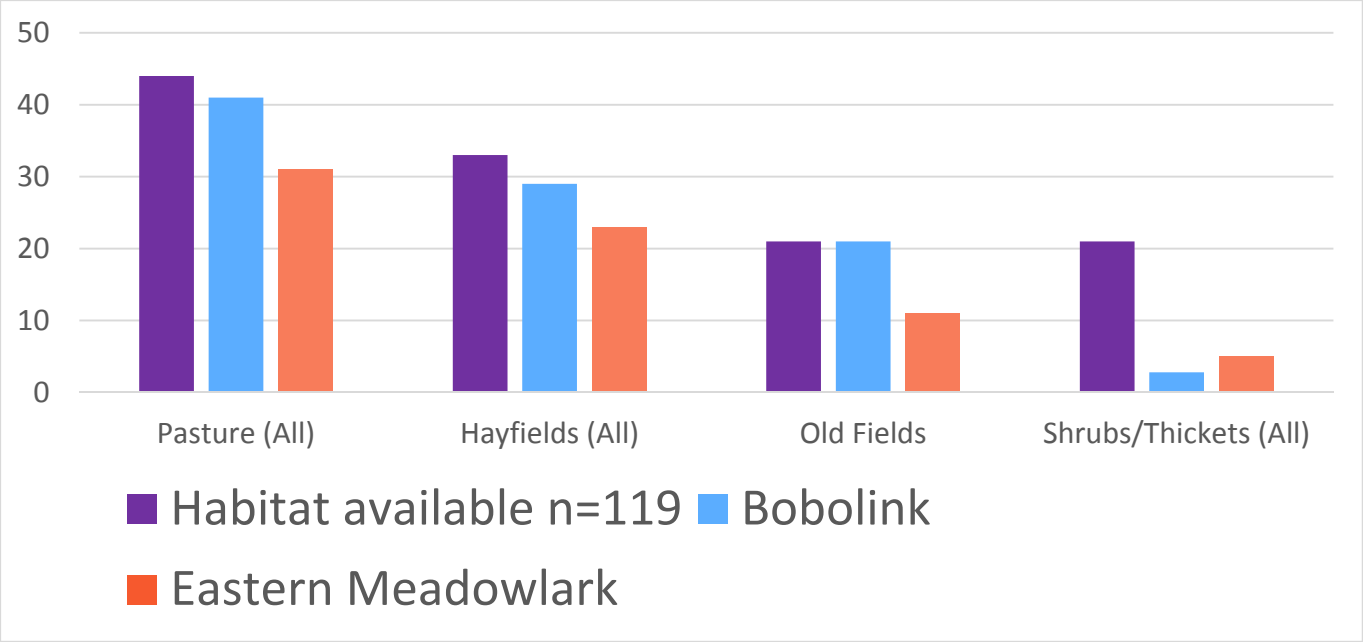

Figure 3: Habitat Use by BOBO & EAME

Definitions:

Pasture (All) 37%: These are mostly unimproved pastures (77.3%) with low intensity grazing of one cow/ha, but also included are pastures with high intensity sheep grazing (22.7%).

Hayfields (All) 27.8%: Except for two fields in 2014 and one partial in 2015, these hayfields were not cut before July 1 and the majority are harvested only once. Most of the hay is used for beef cattle or sheep.

Old Fields 17.6%: These are either hayfields or pastures that have not been mowed or grazed in three to eight years. These have no or a very low percentage of woody vegetation.

Shrubs/Thickets (All) 17.6%: This is mostly early successional bird habitat with different amounts of shrubs covering the former pastures/hayfields.

According to the bar graph above, Bobolink were using 93.2% of all pasture habitat, 87.9% of all hayfields, 100% of old fields, and only 13.3% of available shrubs/thickets habitat. Eastern Meadowlark were using 70.5% of all pasture habitat, 69.7% of all hayfields, 52.4% of old fields, and only 23.8% of available shrubs/thickets habitat. These numbers represent the average percentage over the two years. From this data, it appears Eastern Meadowlark are more tolerant to shrub encroachment than Bobolink. Old fields are much better tolerated by Bobolink (100%) compared to Eastern Meadowlark (50%). This data represents occurrence only, not abundance.

For data on Bobolink and Eastern Meadowlark sightings by habitat use, see Appendix.

Project Objective

5. Suggestion of optimal surveying techniques for Bobolink and Eastern Meadowlark

Study sites: Amherst Island
Length of Study: four years
Method: 91 point counts

Method

The majority of our point count stations were located in open grassland habitat with good visibility and many with water on the other side of the half circle. The half circle counts were used so that only open grassland habitat was surveyed and not water/shoreline habitat. The roadside point counts, where all locations and behaviours of the two focus species were recorded in the 100 m or 200 m circle shown on the survey sheets, worked very well. Since observers recorded the sightings within 100 m and 200 m circles, this data can be separated for analyzing, if needed. Using the half circle provides more point counts, albeit more data points. All off-road point count stations were divided the same way, and the observation time for all was five minutes. Spending five minutes on a half circle allowed more time in the area without turning around to look at a full circle as required for the BBS (Breeding Bird Survey) point count stations. While the focus was on Bobolink and Eastern Meadowlark, other mostly grassland species were included on the survey sheets and could be reported. See Appendix for survey sheets.

The data from the four point count dates provides us with information on proper survey dates for Bobolink and Eastern Meadowlark.

Benefits of Survey Technique

The first and second May survey periods provided us with good arrival dates for male Bobolink on many stations, and many pairs and breeding activities were recorded towards the end of May. Additionally, it showed that this is an excellent time to observe singing or paired Eastern Meadowlarks and it’s a much easier observation time than in early June (when many breeding bird surveys occur), because they are often very quiet when feeding young fledglings, and sometimes females are already incubating a second brood.

The point count data did show that during the first two weeks in June, breeding male Bobolinks are still easy to observe on their breeding sites.

During the last two weeks in June, we also noticed a sudden increase of male Bobolinks (up to 12) and sometimes a few females in hayfields and pastures; these were not recorded previously even on sites where nest monitoring occurred intensively. This was also observed by J. McCracken in Norfolk County in 2012 (Richmond et al., 2014). He suspected failed breeders from nearby hayfields with early mowing as the cause for the mostly male Bobolink influx to the area, with long grasses where cover was still available. Since no mowing occurred during this time on Amherst Island, we suspect predation is the reason for the same activities here.

Concerns

What becomes a major concern is that many survey protocols, including those for mitigation projects, allow Bobolink surveys during all of June in southern Ontario. These late June sightings, with their increased number of failed nesting male Bobolink recorded, are included in analyzing population and abundance data; thus the data will wrongly show higher population sizes and higher abundance. The sightings recorded after June 15 should not be included in any data analyses.

As already mentioned in the Alternative Population Data paragraph under Objective 3, we recommend the Nest/Pair monitoring method as the best way to achieve the most precise data on abundance and population size for Bobolink.

Project Objective

6. This baseline information can be used to measure the impact of road widening and installation of wind turbines on the critical habitat for species. This refers to the impending Amherst Island Wind Project.

Study sites: Amherst Island
Length of Study: four years
Method: 116 point counts

As seen from our results in Objectives 1 and 2 above, the farming practices of (a) low stocking rates in the majority of the cattle pastures and (b) not mowing almost all hayfields before July 1 (and the vast majority of fields not before July 10) demonstrate that the current land management practices provide highly functional critical habitat on Amherst Island. Additionally, the maps in the Stantec Species at Risk Report (2013) show the close proximity of some of their highest total point count records for Bobolink

and Eastern Meadowlark to their proposed turbine locations, access roads, substations and patch plants or near existing roads where widening is proposed. Adding vertical structures to their breeding habitat will produce fragmentation; therefore additional habitat will be destroyed. This means that at least 123 ha of highly functional critical habitat will be destroyed.

Since many of our own 116 point count stations are located near where the destruction of the critical habitat will occur, we will be able to measure the impact after implementation of the Amherst Island Wind Project, which received approval recently. This will come too late to change the expected irreversible harm. The following are our main areas of concern:

1. Losing 123 ha of highly functional critical habitat will affect the whole Bobolink population on Amherst Island. Stantec's 136 ha of recommended enhancement sites will not provide replacement habitat, because most of this is already highly functional critical habitat, and the land management practices have been very beneficial for Bobolink and Eastern Meadowlark for many years at these sites. Stantec's Species at Risk Report (2013) shows their Bobolink and Eastern Meadowlark point counts for these enhancement sites are very high.

2. Even more concerning is that most of Stantec's recommended enhancement sites are on sites where wind turbines are already planned or nearby. This means that parts of these sites will have critical habitat destroyed, and also, the enhanced habitat will be adjacent to the wind turbines.

3. This is very difficult to understand, since the Stantec *Wolfe Island Wind Plant Post-Construction Follow-Up Plan, Bird and Bat Resources Monitoring Report Nos. 1-7* shows a high mortality rate of Bobolink especially during the breeding season. From these data, we can estimate that 342 Bobolinks were killed by turbines on Wolfe Island over the seven monitoring periods from May 2009 through June 2012, and that an average of 103 were killed per year, or an average of 1.2 per turbine per year. A large number of wind turbines on Wolfe Island are located in farm fields with row crops (and not known to have nesting Bobolink). On Amherst Island, almost all turbines will be located in critical habitat for Bobolink and since the plan shows enhancement sites nearby, we are concerned that the mortality rate will be significantly higher on Amherst Island.

Conclusions and Recommendations

The results illustrate high breeding success for both focal species: Bobolink and Eastern Meadowlark, indicating that the current practices of cutting hay after July 1 and grazing the mostly unimproved pastures with stocking rates below one cow/ha are beneficial. These methods of land management should be continued.

A large population drop seen in several recent studies in Ontario (Macdonald, 2014), including our four-year study, clearly jeopardizes the Ontario Government Response Statement to slow the annual rate of population decline for both species to an average of no more than 4% per year to 0% over the next 15 to 20 years, mainly because the 2015 numbers are significantly lower than estimated.

Using annual surveys for Bobolink and Eastern Meadowlark through the Breeding Bird Survey program to track changes in the species' distribution and abundance is very limited, since the majority of habitat is forest habitat (not grassland habitat) and the three-minute duration is considered too short to detect all birds. Most are done in early June, and our data shows this is not the best time to observe Eastern Meadowlark in southern Ontario.

Therefore, our recommendations include the creation of regular studies, such as the one done in Norfolk County where the Breeding Bird Atlas point count data was used, to give reliable, consistent data (at least every five years) to provide a clearer perspective on the condition of our threatened grassland birds (Richmond et al., 2014).

The Amherst Island current grassland habitat of 3,400 ha is significantly larger than the 2,250 ha yearly target for the new grassland initiative announced in the Government Response Statement and therefore, a great candidate for inclusion. However, the recent practice by one farmer to convert the unimproved pastures to improved pastures, as seen in our case study with its devastating results to grassland bird species, and the recently approved Amherst Island Wind Project are reasons for concern. These will certainly have a very negative impact on this distinct Island of grassland bird habitat.

<u>Recommendations for Landowners</u>

Allow sustainable grazing of one cow/ha to:

- Promote healthier root systems and vigorous leaf growth
- Promote nutrient cycling and build-up of organic matter in soil
- Allow sheep grazing to prevent invasive species, such as Red Cedar, from taking over
- Keep cats inside, at least during June/July, to reduce predation to vulnerable fledglings
- Allow hunting of White-tailed Deer to avoid deer overpopulation and predation of grassland birds

<u>Recommendations for Organizations</u>

Agriculture clearly plays the main role in protecting grassland species for the future, but other landowning groups should manage their land for Bobolink and Eastern Meadowlark:

- Land trusts
- Conservation Authorities

- Municipal land – such as former landfills, large (unused) manicured industrial properties – can play a vital role in grassland restoration
- Support farmers who put more effort into agricultural management – with cooperative environmental ventures, government incentives, policies that support farm diversity and resiliency – and buy their local products.

Figure 4: photo of marginal pasture on Amherst Island

Four Additional Case Studies

The following four case studies were also completed during the project period. These provide additional information and relevant conclusions regarding the grassland birds project.

1) KFN: Martin Edwards Reserve Case Study

Study sites:
Amherst Island
Length of Study: two years

In 1986, the Kingston Field Naturalists (KFN) bought 96 ha to use as a Conservation Area for migrating and nesting waders and ducks. In this area, 75 ha are maintained as grassland, using cattle to keep succession in check. In 2004, a Stewardship Plan was prepared for the KFN. The Lennox & Addington Stewardship Council recommended restriction of the cattle for the protection of the grassland birds. The Plan also recommended comprehensive monitoring plans to describe the impacts of cattle grazing and to learn more about the reproductive success and limiting factors of breeding grassland species.

The map below shows selected management including the times when cattle enter different fields.

Removal of the carp from the DUC-managed pond and stabilization of the berm around it (where warranted) should be another priority. If possible, this should be accomplished by draining the pond near the end of August or beginning of September and then removing any remaining fish that do not return to Lake Ontario. To determine if the pond draining was successful, the pond should be regularly checked for the presence of carp.

Section 6: Detailed property map

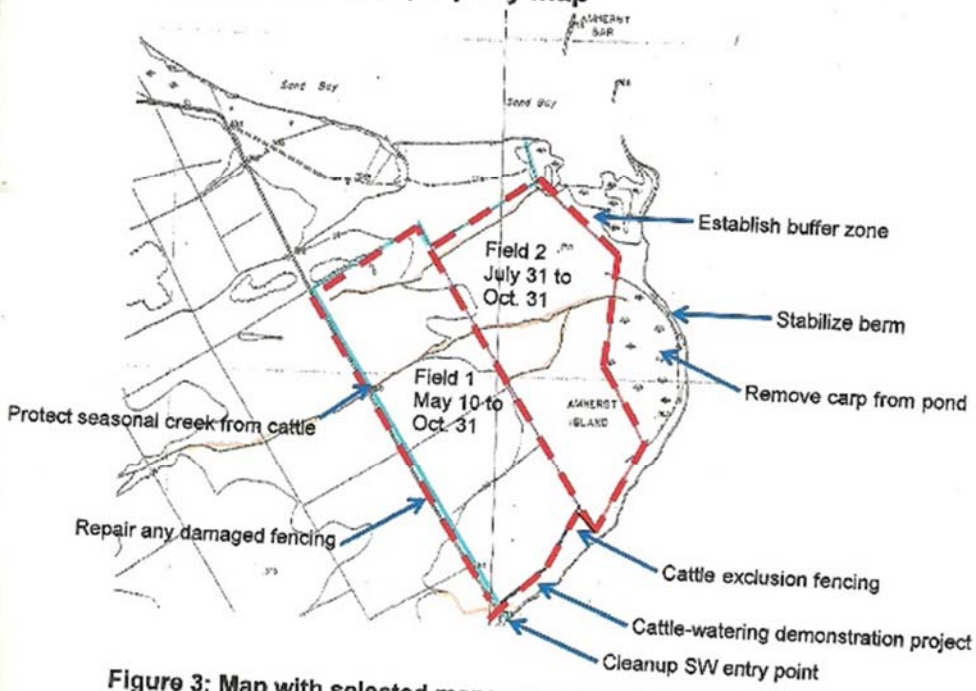

Figure 3: Map with selected management identified.

Figure 5: Martin Edwards Nature Reserve property map

The above management plan prevented the cattle from grazing in Field 2 before July 31 in 2013, 2014 and 2015. In addition, because of poor fencing and fencing replacements, cattle grazing in Field 2 in 2013 were limited to a very short time in August; there was no grazing in 2014; and grazing occurred in 2015 only after the monitoring ended. The Simpson family has grazed cattle at this site for over 40 years. In the past, there have been about 95 head of beef cattle on this property, but it has been greatly reduced at least since 2004.The current count for the last three years shows 48 to 60 head of cattle; this amounts to a stocking rate of 0.72 cows/ha, which is 20% lower than other cattle pastures on the Island.

Results

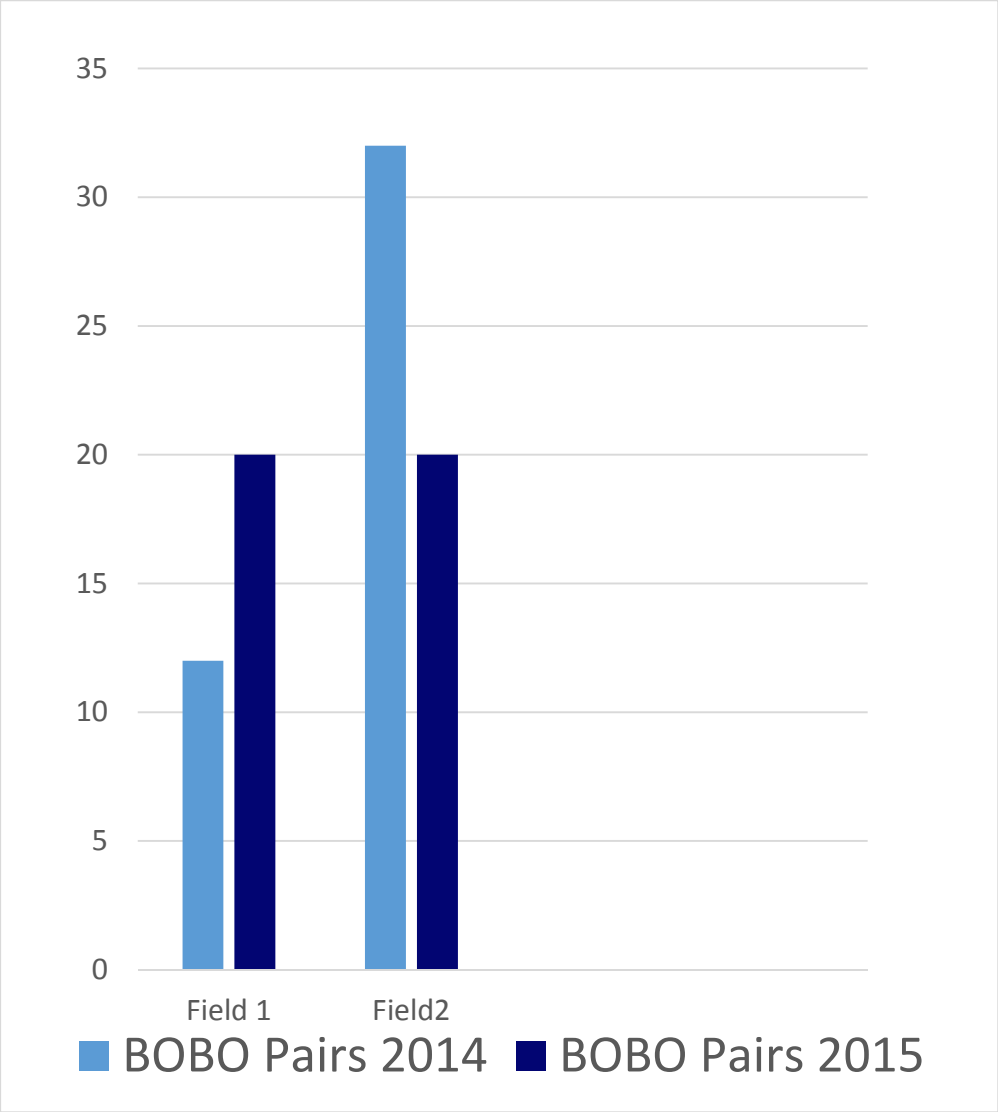

Figure 6: BOBO by pairs in Martin Edwards Nature Reserve

The above chart shows that almost three times more Bobolinks used Field 2 than Field 1 in 2014, and the same numbers were found in both fields in 2015.

To make sense of the results, we need to understand that 2013 was a dry year for the Island. With the cattle grazing predominately in Field 1, by the end of the season, most of the vegetation was very short and several bare patches were visible. It has been observed that during dry, hot spells in the past, the cattle stay close to the watering station, located in Field 1, and graze near it. Additionally, the spring of 2014 was cold and vegetation in Field 1 grew very slowly, with little cover for Bobolink to nest in. Not surprisingly, only 34% found cover to nest in Field 1.The 20% lower breeding success in Field 1 in 2014 compared to 2015 could also be cover related.

Breeding Density
In comparing the Breeding Density (using the average of the two years 2014/15) with two similar size pastures with similar stocking rates near the centre of the Island, the results are as follows:
Bobolinks in centre pastures: 44.5 pairs /km^2 and on MER: 50 pairs /km^2

Breeding Success
In comparing the Breeding Success in pastures near the centre of the Island, the results are as follows:
Bobolinks in centre pastures: 58.6% and on MER: 65.5%

Possible reasons for the slightly higher breeding density and higher breeding success could be the lower stocking rate at MER and the higher predation by cats at the pasture near Stella.

The Eastern Meadowlarks showed 2 pairs in each field in 2014 and 1 pair double brooding in Field 2 in 2015.

Does this Stewardship Plan work?

Although the numbers above show slightly better results at MER than the pastures near the centre of the Island, several concerns with the current Stewardship Plan were noted.

a) The current setup prevents cattle from grazing Field 2 first in the spring without closing Field 1 to the cattle, which can lead to overgrazing especially during drought conditions.
b) Field 1 is showing signs of overgrazing with many bare spots visible (many around trees) and severe damage from trampling around the seasonal creek.
c) In Field 2, several patches of woody vegetation are slowly increasing and if not controlled by grazers, these will have to be removed by machines in a few years.

To resolve the concerns above and also to prevent the natural succession of woody vegetation in Field 2, a solution for grazing Field 2 first in the spring is required. This can be done most cost efficiently with gates and inclusion fencing between the watering

station and Field 2. A more expensive option is to move the watering station between Fields 1 and 2.

2) CRCA - Owl Woods Nature Reserve

Study sites:
Amherst Island
Length of Study: two years

The famous Owl Woods Nature Reserve harbours many species of Owls. It also provides breeding habitat for Species at Risk such as Whip-poor-will, Eastern Meadowlark and Bobolink.

Figure 7: Photo at Owl Woods Nature Reserve

The Cataraqui Region Conservation Authority (CRCA) maintains the 24.8 ha of Owl Woods Nature Reserve as grassland using sheep to control succession. The sheep (500 head) enter the reserve in early June for a few weeks, allowing grasses to provide

cover for the focal species (Bobolink and Eastern Meadowlark), and the sheep return for several weeks in September.

Objective: Discover if this area provides breeding habitat for Bobolink and Eastern Meadowlark

Results

Owl Woods Reserve:
Bobolink: 10 pairs in 2014 and 11 pairs in 2015
Eastern Meadowlark: 2 pairs in 2014 and 1 pair successfully double brooding in 2015

Breeding Density for Bobolinks:
All Pastures on Amherst Island: 4.7 pairs /10 ha
Owl Woods Reserve: 4.4 pairs /10 ha
Intensively grazed sheep farms on Amherst Island: 0.7 pairs/10 ha

Breeding Success for Bobolinks:
All Pastures on Amherst Island: 57.5%
Owl Woods Reserve: 52%
Intensively grazed sheep farms on Amherst Island: not applicable due to low numbers

Note: Breeding Density and Success are the averages from the 2014/15 surveys.

3) Unimproved versus Improved Pasture

Study sites:
Amherst Island
Length of Study: three years

This 72 ha grassland habitat property was rented and used mostly as unimproved pasture with some hayfields. A 2013 survey documented 2 pairs each of Short-eared Owls and Eastern Meadowlarks, and 28 pairs of Bobolinks.

New ownership in May 2014:
The new owner bulldozed most existing fences and shrubs and used a large roller to flatten the soil and then reseeded the pasture. During the transition to an improved pasture, at least one nest of Short-eared Owls and one of Eastern Meadowlarks were destroyed in the process. Bobolinks were not affected, since they had not started nesting yet.

A survey in 2015 revealed only 4 Bobolinks nesting in the improved pasture: an 85% decline from 2013. While this land management practice is very uncommon on Amherst

Island, if increased, the consequences for all grassland birds on the Island would be devastating.

4) Lemoine Point Conservation Area

Study sites:
Kingston
Length of Study: two years

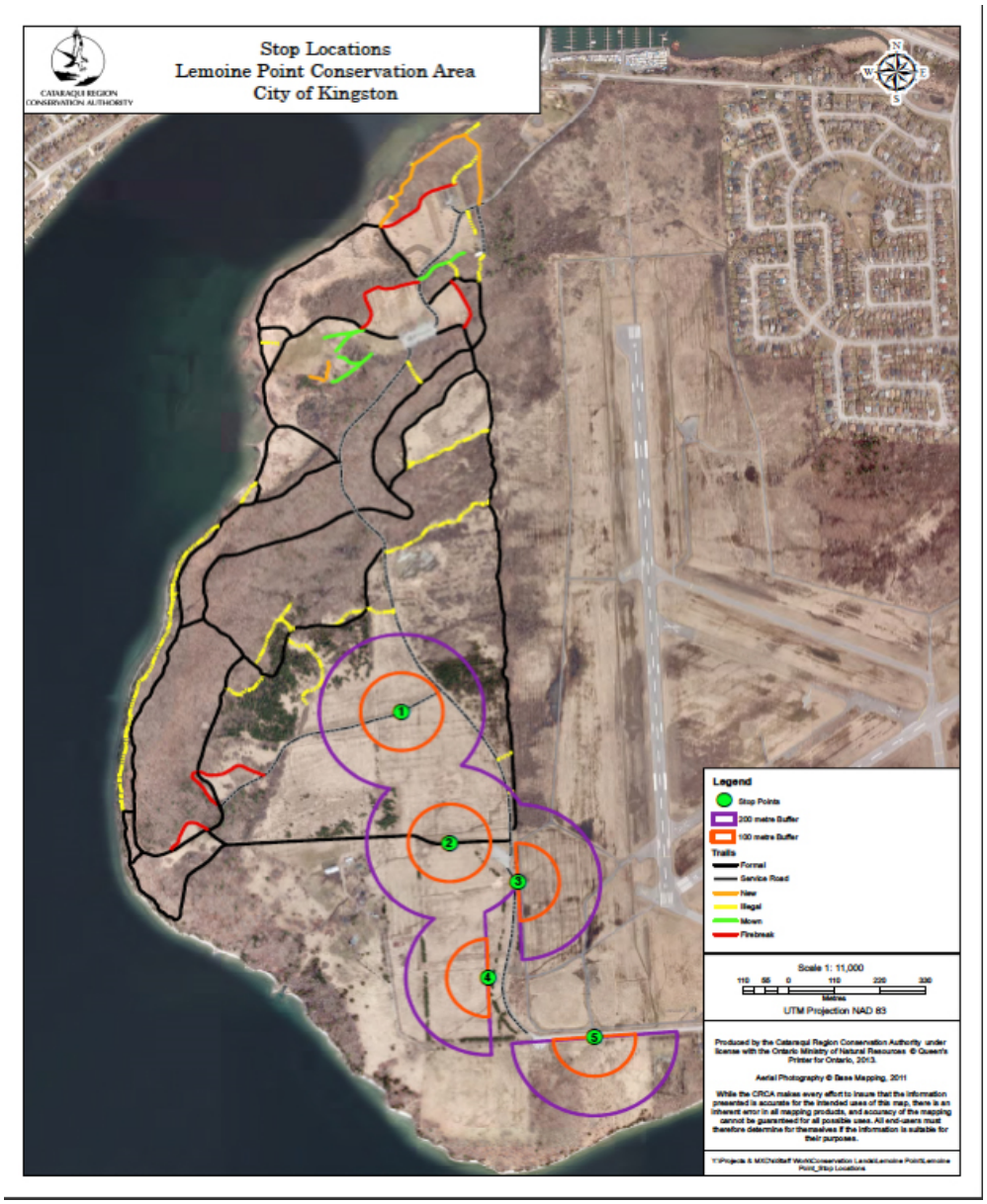

Figure 8: Point count stations at Lemoine Point

In 2013, seven point count stations were established at Lemoine Point Conservation Area, adjacent to the Kingston Airport. Most of this property is owned and managed by the Cataraqui Region Conservation Authority (CRCA). The recently abandoned hayfields have a healthy population of grassland birds. These point count stations were added to the project as part of the habitat use study, to increase abandoned hayfields habitat.

Results will be provided to CRCA to help in their land management practice on grassland bird habitat of the conservation area. Five of the point count stations (half circles) are located within the conservation area, four (1S, 1N, 2N and 4) are abandoned hayfields, and one (2S) is early successional bird habitat/tree plantation. Station (3) is short-grass bird habitat owned by the airport, and station (5) is an active pasture on the south side of the road.

Results

The data from seven point count stations at Lemoine Point recorded 33 Bobolink or 4.714 per station in 2014, and 24 Bobolink or 3.43 per station in 2015.There were also 11 Eastern Meadowlark or 1.571 per station in 2014, and 3 Eastern Meadowlark or 0.42 per station in 2015.

For the two years of 2014/15, the data from the seven stations at Lemoine Point recorded 57 Bobolinks or 4.07 per station. For the same time period, on all 119 point counts (from Amherst/Wolfe Islands and Lemoine Point): 729 Bobolink or 3.01 per station were recorded. Additionally, (from the seven Lemoine Point stations) there were 14 Eastern Meadowlark or 1.0 per station. This compares to all 119 point counts, where 168 Eastern Meadowlark or 0.69 per station were recorded.

This is significantly higher than the result from all 119 point counts, indicating that the existing grassland habitat at Lemoine Point is important to both species.

One concern is the abandoned hayfield on station (4), since this is the only station without any focus species in 2015. With three sides already surrounded by rows of trees – a recent tree planting project – the only open area is closed off with fencing to protect the seedling trees from White-tailed Deer.

The chart below from Bird Studies Canada shows the influence of wooded sides bordering a field on occurrences by four grassland bird species, including our two focal species (McCracken et al., 2014).

The Bobolink and Eastern Meadowlark Ontario Government Response Statement stresses the importance having conservation authority land included in their stewardship Initiative to slow the 4% current decrease to 0%. With the surrounding open space to the airport and active pasture to the south, Lemoine Point Conservation Area is capable of providing the right habitat for a thriving grassland bird community, which includes Bobolink and Eastern Meadowlark.

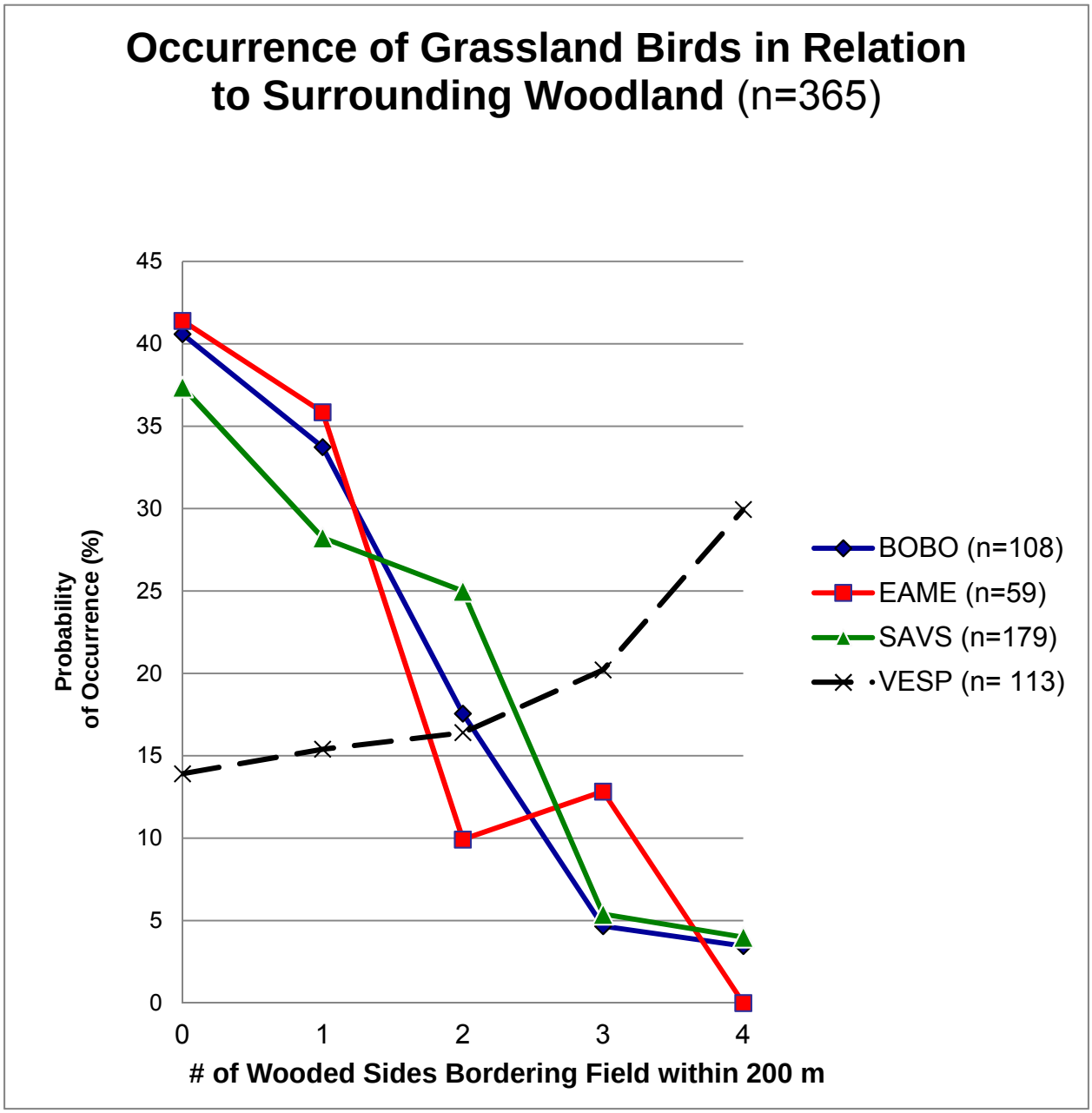

Figure 9: from Bird Studies Canada, 2014

BOBO – Bobolink
EAME – Eastern Meadowlark
SAVS – Savannah Sparrow
VESP – Vesper Sparrow

Kurt Hennige, February 26, 2016

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