

Grassland Set-Aside Breeding Bird Survey

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Photo 1: A Barn Swallow perched near a grassland set-aside at a farm in Delta

Program background

Grasslands are important habitats for birds, including several species at risk found in Delta, such as Barn Owl, Short-eared Owl and Pacific Great Blue Heron. The Delta Farmland and Wildlife Trust (DFWT) aims to improve grassland habitat in the Fraser River delta by entering into stewardship agreements with farmers to manage farmland as grassland set-asides (GLSA). Grasslands set-asides are enrolled in the program for up to four years and are planted with many types of crops including grasses, clover, sunflower or other floral mixes.

Previous studies at DWFT demonstrate the utility of GLSAs in providing wintering habitat for species such as Townsend's Vole, Barn Owl, and Northern Harrier. The aim of this survey was to determine which species are using GLSAs for breeding and foraging habitat during the spring and summer months. By conducting point count surveys, we were able to survey for both birds that use GLSAs for breeding habitat and looking at which birds use GLSAs for foraging habitat, either during migration or during the breeding season.

Methods

Surveys were conducted at 9 grassland set-aside fields in Delta, BC. Distance-based point counts of 50 m were conducted to measure songbird abundance within GLSAs (Resources Inventory Committee 1999). Five-minute point counts were conducted weekly from May 10 to June 10, 2024. Surveys began at sunrise and were completed within four hours. Surveys were not conducted when winds exceeded 12 km/hr, temperatures were below 7 °C, or during rain.

Within the 9 GLSA fields sampled, 23 point count locations were randomly selected. Point counts were located at least 200 m apart when there were more than one per field. Point count locations were placed at least 100 m from the field edge where possible, and at least 50 m from the edge when the shape of the GLSA did not allow for a 100 m buffer.

Point counts were limited to all species seen and heard within a 50 m detection radius. Distances of each species were recorded in meters using a Nikon Prostaff 1000 rangefinder.

To examine the relationship between songbird occupancy and grassland set-aside site characteristics in detail, we used spatial occupancy models using the SpOccupancy package in R (Doser et al., 2022). We generated a multi-species spatial occupancy model using the *spMsPGOcc* function. The model was run with default priors, 6,250 samples across 6 chains with a thinning rate of 2 and burn rate of 100 for a total of 18,450 posterior samples. All parameters converged at $R\text{-hat} < 1.1$ and species-level Bayesian p-values were between 0.18 and 0.60.

Detection covariates included: time of day, day of year, temperature (°C), wind speed (Beaufort scale) and cloud cover (0-4 scale). Occurrence covariates included: GLSA planting year, GLSA field size (acres) and GLSA planting mix (1 = Grass & Clover, 2 = Pollinator Mix).

Results and Discussion

Species richness and breeding birds

A total of 14 species were observed across 70 individual point counts conducted throughout the season. We considered a bird likely breeding in the area if it was observed during the survey at least three times out of seven visits (Resources Inventory Committee 1999). By these criteria, we observed the following 5 species that were using the GLSA for breeding habitat or were nesting nearby and regularly used the set-aside for foraging habitat: Savannah Sparrow, Common Yellowthroat, Marsh Wren, Red-winged Blackbird and Brewer’s Blackbird.

Grassland set-asides were categorized as being planted under two types of seed mixes: a Grass & Clover mix (n=3) or a Pollinator mix (n=4). No significant differences were detected between each of the mix types and in species richness or the number of presumed/confirmed breeding birds present in each GLSA (Figure 1).

	Species richness
GLSA – Pollinator Mix	3.6±1.3
GLSA - Grass & Clover Mix	3.9±1.5

Figure 1. Species richness (number of species observed) by GLSA type

Grassland set-aside occupancy

The multi-species spatial occupancy model indicated some effects of detection on bird occupancy. For these survey-level effects, day of the year had a positive effect for Barn Swallows and a negative effect on Red-winged Blackbirds (Figure 2). These results indicate that in future years, it may be beneficial to start the survey slightly earlier and extend the survey window later to ensure that occupancy is accurately detected for both species.

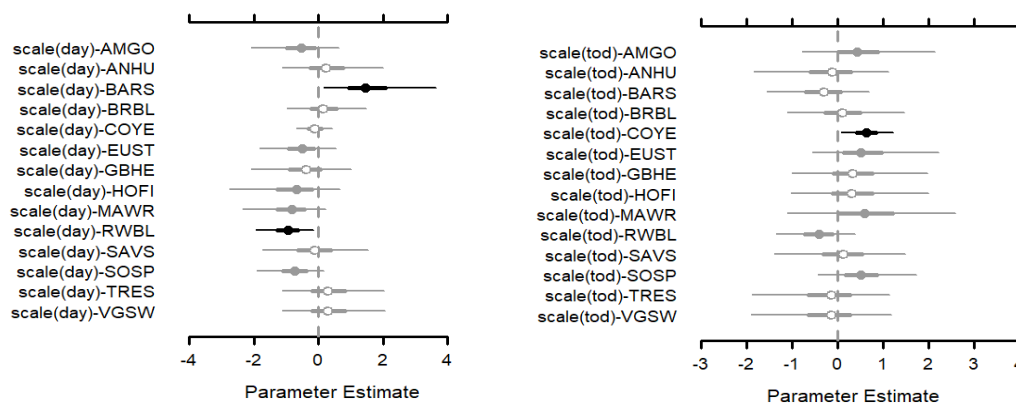


Figure 2. Species-level occupancy by day of year (day; left) and time of day (tod; right)

There was also a positive effect of time of day on occupancy for only the Common Yellowthroat (Figure 2). Just as extending the survey window would help to ensure accurate detection of occupancy for Barn Swallows, the time of the survey within the day may also be slightly expanded for accurate Common Yellowthroat detection. Weather variables (Wind, Cloud, and Temperature) had no effect on occupancy probability, which is expected as surveys were conducted within a very narrow range of acceptable conditions ideal for birds.

There were no significant effects of GLSA site-level characteristics on occupancy (Figure 3). Interestingly, these results indicate that GLSAs are occupied across all bird species independently of field size, grass planting mix type or age of GLSA. Spatial occupancy models are based on presence/ absence data which does not take in to account the number of a given species observed in each field. More research is needed to determine whether these or other GLSA characteristics play a role in supporting higher nesting densities.

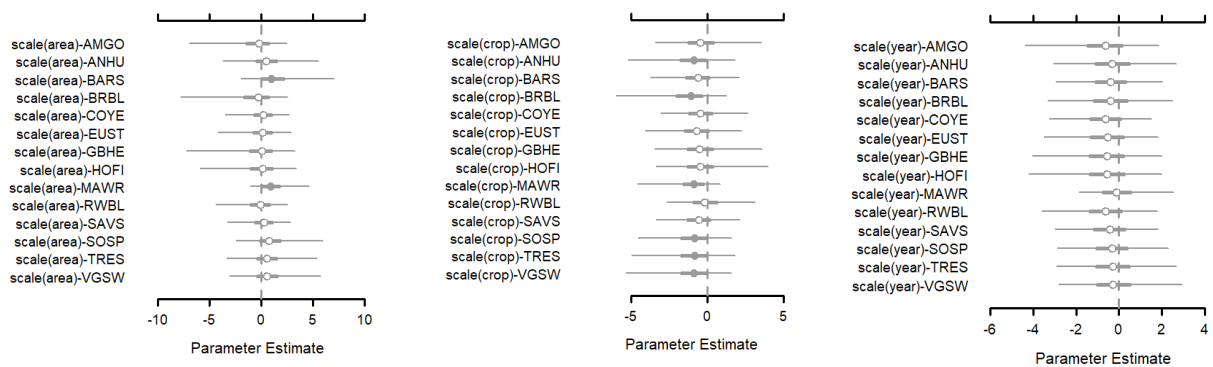


Figure 3. Species-level occupancy by area (acres; left), crop type (1= Grass & Clover, 2=Pollinator Mix; middle) and year (GLSA planting year; right)

Species of conservation concern

Barn Swallows are a frequently detected species during this annual survey and have been a presumed breeding bird over the past two years. However, this season had fewer Barn Swallow detections than usual, even at previously occupied GLSAs. During the 2023 season, Barn Swallows were observed in every GLSA, and in most cases every week at every site. This year they were observed in only 2 of 7 GLSAs and the first observation was on May 30th, during the fourth survey week.

As indicated in the spatial occupancy model, Barn Swallow occupancy was positively associated with day of the year and in future years the survey window should be extended later into June to accurately monitor for this species of conservation concern. It may also be possible that Barn Swallows become more active later in the day as they primarily forage insects, which may become more available when day temperatures increase (Brown and Brown 2020).

In 2023, we trialed the use of autonomous recording units (ARUs) to monitor bird vocalizations throughout the day and night. To evaluate whether the decline in Barn Swallow observations is due to inadequate sampling or a real decline, future surveys should include ARUs as a secondary verification.

Works cited

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