Cassin’s Sparrows Defend Territories with More Shrubs than Surrounding Habitat

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ABSTRACT.---text.

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Cassin’s Sparrow (*Peucaea cassinii*) is a species of arid and shrubby grasslands of central North America (Dunning, Jr. et al. 1999). It appears to have a stable population in North America based on Breeding Bird Surveys (Sauer et al. 2017), but trends vary by state, region, and time period (Dunning, Jr. et al. 1999). It is interesting for its erratic population distribution, with few returns on banded birds, making it difficult to study (Dunning, Jr. et al. 1999).

Few studies have examined this species’ movements or precise habitat preferences (Dunning, Jr. et al. 1999; but see Cooper et al. 2014). Summer rainfall, and possibly grasshopper abundance as a regular food, does appear to be related to the erratic distribution. Some past studies suggest what. Most of these studies, however, do not focus specifically on Cassin’s Sparrows (Ruth 2000; but see Cooper et al. 2014).

In Oklahoma, Cassin’s Sparrow is not currently declining significantly (Sauer et al. 2017). Recent work at one site in northwestern Oklahoma (Cooper et al. 2014) suggests Cassin’s Sparrows prefer habitat with more sagebrush than surrounding areas and are more often found on northern slopes.

Our study aims to provide further information on Cassin’s Sparrow habitat preferences across multiple habitat types by examining six study sites in short and mixed grass prairies in western Oklahoma. We ranked territorial defense behaviors in response to playbacks across gridded plots to quantify the importance of different vegetation species and cover to Cassin’s Sparrow in this region.

METHODS

We conducted our surveys at seven plots within six sites in 2014 (Fig. 1). Ecoregions are as defined in Diamond and Elliot (2015). Black Mesa State Park contains ?? ecoregions. One plot (400 x 1,300 m) was located in ??. Cimarron Hills WMA contains ?? ecoregions. One plot (800 x 800 m) was located in ?? [habitat type]. Optima Wildlife WMA contains ? ecoregions. Two plots (both 800 x 800 m) were located in ??. Packsaddle WMA contains ?? ecoregions. One plot (800 x 800 m) was located in ??. Rita Blanca WMA contains ?? ecoregions. One plot (800 x 800 m) was located in ??. Selman Ranch is a 14,000 acre guest and hunting ranch (Selman Ranch 2009) contains ?? ecoregions. One plot (600 x 600 m) was located in ??.

Plots ranged from 0.36-0.64 km2 with 100 m spacing between survey points within each plot. At each survey point we played a Cassin’s Sparrow primary song three times, with 30 sec of observations between each playback (for a total of 1.5 min observations). Sparrow behavior was ranked from 0 to 7 (0: no response; 1: distant song; 2: chip notes; 3: counter song; 4 counter display; 5 approach; 6: circling playback; and 7: aggressive counter song). Walking time between points was ~5 min and each plot was completed in 2-3 hours. The maximum ranked behavior and closest approach distance (in m) at each point were used as our response variables.

Vegetation surveys were conducted at ?? points that had been observed both with and without Cassin’s Sparrow territorial defense behaviors. At each sampling location we used four Daubenmire 1 m2 plots (one in each cardinal direction 10 m from the grid point) to record proportions of grass, forbs and woody vegetation, standing dead plants, bare ground, and vegetative litter (Daubenmire 1959). We also counted vegetation <1 m and >1 tall in a 10 m radius around each point in these categories: yucca, sagebrush, sandplum, cholla, tree species, or other shrub species.

Principle Components Analysis (PCA) was used to reduce vegetation variables in Daubenmire plots, counts of shrubs and trees < 1 m, and counts of shrubs and trees > 1 m. We kept PCs with eigenvalue >1. We used Pearson correlations to calculate loadings and interpreted loadings above |0.33| (Tabachnick and Fidell 2007). These reductions resulted in a total of nine variables: Daubenmire PC1, PC2, PC3; shrubs and trees >1m, and shrubs and trees <1m.

We tested whether absence (response 0) or presence (a lumped response 1-7) of a Cassin’s Sparrow territorial response was related to vegetation PCs using binomial generalized linear mixed model. We tested whether response rank (0-7) was related to vegetation PCs using multinomial logistic regression (NOT YET IMPLEMENTED). Finally, we tested whether closest approach distance (when a Cassin’s Sparrow responded) was related to vegetation PCs using a linear mixed model. We used location as a random effect in all mixed models to account for some points including the same birds defending multiple points.

RESULTS

Presence or absence of Cassin’s Sparrow territorial defense was significantly related to tall shrubs and trees PC3 (Fig. 2) and short shrubs and trees PC1 (Fig. 3); it was marginally related to tall shrubs and trees PC1. PC loadings indicate what vegetation variables were important in the response (Table 1). Tall shrubs and trees PC3 is correlated with counts of yucca and trees (typically junipers or acacia). Short shrubs and trees PC1 is correlated with yucca, sagebrush, sandplum, cholla, and other shrubs. Tall shrubs and trees PC1 is correlated with sagebrush, sandplum, cholla, and other shrubs. Thus, Cassin’s Sparrows defended territories with

Multinomial results here (strength of defense).

The closest approach distance to playback was not significantly related to any vegetation PCs.

DISCUSSION

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TABLES

Caption that is intelligible without text. Supplement not duplicate figures. Indent and double-space, beginning with TABLE 1. Horizontal lines above and below box head and at end. Same size font as rest of document.

TABLE 1.

TABLE 2. Principle components analysis loadings for principle component axes that were significant in vegetation analyses.

FIGURE CAPTIONS

FIG. 1. Map of study sites. To be created.

FIG. 2. Graph of main significant result.

FIG. 3. Graph is other main significant result.

FIG. 4. Graph of PCs showing sites.

FIGURES

FIG. 1.

FIG. 2.