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## Interacting Fire and Grazing is for the Birds

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A Summary of Hovick et al. 2014 and Hovick et al. 2015

### GRASSLAND BIRD POPULATIONS

Alteration of grassland disturbance regimes has greatly diminished grassland structural complexity and is likely a contributing factor to the decline in grassland bird populations. As a group, grassland and arid land bird populations (i.e. rangeland birds) have experienced greater declines than any other group of birds over the last half century (NABCI 2014, Sauer et al. 2014). Restoring heterogeneity to grasslands through the interaction of fire and grazing has been shown to increase diversity in breeding grassland birds, but the level of heterogeneity (i.e. number of patches) that maximizes diversity is unknown. We sought to examine breeding bird response to a gradient of fire and grazing dependent heterogeneity.

### NON-BREEDING BIRDS

Relative to the breeding bird community, we know very little about grassland bird communities during the non-breeding season. Short-distance migrants and resident species that spend their winters in the Great Plains are affected by rangeland management decisions and improved knowledge of species habitat use and occurrence will benefit grassland bird conservation efforts.

We evaluated non-breeding bird abundance across time since fire and grazing. We found that common, generalist species such as the Savannah Sparrow (*Passerculus sandwichensis*) were found in most patch types. Specialists, such as Smith's Longspur (*Calcarius pictus*) increased in abundance and the probability of patch occupancy in the most recently disturbed patches (Fig. 1). Conversely, LeConte's Sparrow (*Ammodramus lectontei*) increased in abundance and the probability of patch occupancy as time post disturbance increased (Fig. 1). Results demonstrate that heterogeneity is required for avian species diversity.

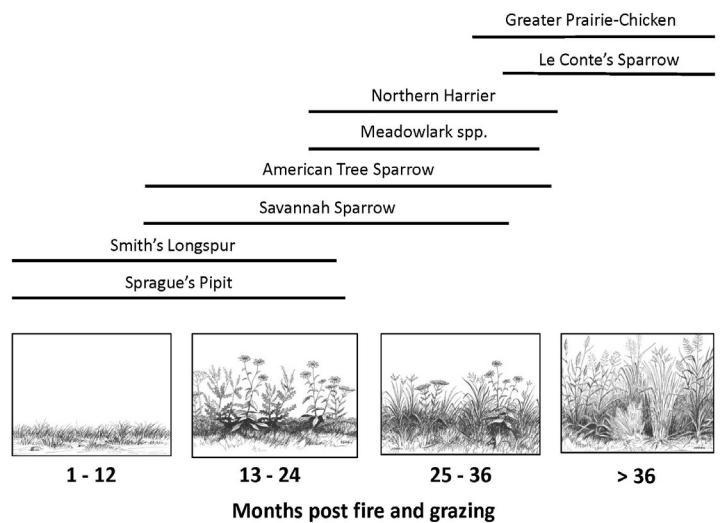


Figure 1. Non-breeding bird use of patches resulting from time post-fire and grazing disturbance in the southern Great Plains.

### BREEDING BIRDS

We quantified breeding grassland bird abundance across seven experimental landscapes that ranged from a one-patch landscape that was annually burned and grazed to an eight-patch landscape that had a four year fire return interval with spring and summer fires. We found that grassland bird diversity increased linearly with increased heterogeneity (Fig. 2). Four of the five species we examined reached maximum densities in landscapes with three or four year fire return intervals and three of five species reached maximum abundances in pastures with six or eight patches. Additionally, an index of bird community change, was nearly four times greater in the most homogenous experimental landscape when compared to the most heterogeneous landscape, indicating that breeding bird community stability is much greater as heterogeneity increases. Species of conservation concern such as the Grasshopper Sparrow (*Ammodramus savannarum*) and Upland Sandpiper (*Bartramia longicauda*) reached maximum abundances in

six- and eight-patch landscapes that both included spring and summer fires while Henslow's Sparrows (*Ammodramus henslowii*) reached maximum abundances in a four-patch landscape with spring only fires.

land processes that can restore patterns of grassland heterogeneity may be the best option for stabilizing grassland bird declines and benefiting native grassland fauna.

### GETTING HELP

Additional information can be found in Hovick et al. 2014 and Hovick et al. 2015 (full citations in the references section). Additionally, The Great Plains Fire Science Exchange has resources on fire, fire effects, monitoring, and more at <http://www.GPFireScience.org>.



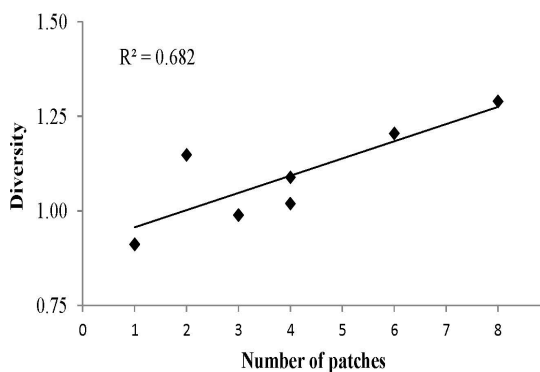
**Upland Sandpiper: Photo taken by Torre Hovick.**

### MANAGEMENT IMPLICATIONS

Restoring heterogeneity increases grassland bird diversity during the breeding and non-breeding seasons. Management focused on restoring natural processes such as interacting fire and grazing may be especially beneficial to specialist species in the southern Great Plains such as LeConte's Sparrow and Smith's Longspur in the non-breeding season and Henslow's Sparrow and Upland Sandpiper during the breeding season. Greater fire-return-intervals and multiple burning seasons (e.g., spring and summer), maximized diversity and stability in the breeding bird community and highlights the importance of heterogeneity for birds that evolved in systems that were a shifting mosaic resulting from frequent disturbance that varied spatially and temporally. Management that focuses on conserving natural grass-



**Dickcissel: Photo taken by Torre Hovick.**



**Figure 2. Diversity of grassland birds in response to a gradient of fire and grazing dependent heterogeneity.**

### REFERENCES

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For more information:

[www.GPFireScience.org](http://www.GPFireScience.org)