Strategies for Reducing the Vulnerability of Grassland Birds to Climate Change within the Central Flyway

A Tallgrass Prairie Restoration in Wisconsin. Courtesy of J. Bernath-Plaisted

INTRODUCTION

Human activity has contributed to significant grassland bird habitat degradation, leading to widespread population declines throughout North America, especially in the Central Flyway. Climate change can further this decline by exacerbating existing stressors. To explore this issue, researchers at the University of Wisconsin-Madison partnered with the Wisconsin Cooperative Wildlife Research Unit, the Midwest Climate Adaptation Science Center, USDA Northern Forests Climate Hub, and the Northern Institute of Applied Climate Science to conduct a synthesis of existing literature, conduct microclimate modeling in grassland habitats, and gather management strategies into a Grassland Adaptation Menu.

KEY ISSUES ADDRESSED

Past studies investigated how grassland birds react to climatological stressors, but there has been little synthesis available to inform how climate change may affect these species. Understanding which climate variables may influence grasslands-dependent bird species will help researchers determine how future changes may impact these species, and which variables are most important. Further, there is a need to understand how grassland habitat conditions may affect the climate exposure of species. Properly identifying microrefugia has been challenging due to limited availability of high-resolution imagery and climate data characterizing grasslands. Ecological complexities coupled with varying land management practices require a multifaceted approach to grassland conservation. However, there has been relatively little guidance available to managers seeking to understand how to best steward grasslands under a changing climate.

PROJECT GOALS

- Determine the effects of climate variables on grassland bird populations.

- Identify key characteristics of grassland microrefugia and develop new climate modeling tactics to locate these microrefugia.

- Develop a menu of grassland adaptation strategies.

Project Location
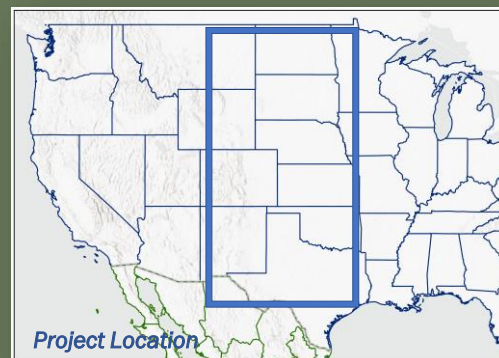
PROJECT HIGHLIGHTS

Literature Review: Researchers first conducted a literature review to synthesize the known effects of climate variables on grassland bird demographics. They found that heatwaves and decreased precipitation negatively impacted survival. With these relationships in consideration, the researchers conducted a review of existing management strategies and identified the strategies best suited for grassland habitat conservation in a changing climate. These strategies were incorporated into the Grassland Climate Adaptation Menu.

Drone use to map microrefugia: The researchers used drones to map variation in microtopography and vegetation conditions within warm-season and cool-season grasslands. Sensors deployed at ground level measured temperature and vapor pressure. Using machine learning, they identified topographic complexity and vegetation cover as key microclimate characteristics affecting climate exposure of grassland nesting birds.

Grassland Adaptation Menu: The researchers used knowledge from the literature reviews to synthesize adaptation strategies for grasslands. They conducted workshops among practitioners to evaluate these strategies and co-develop a Grassland Adaptation Menu.

A Henslow's Sparrow. Courtesy of J. Bernath-Plaisted

LESSONS LEARNED

Continued research is needed to address climate adaptation topics in grassland ecosystems, and to better inform the management of specialized organisms like grassland birds. However, there are still many actions that managers can take. The use of near-surface climate loggers paired with drone imagery provided a novel method for mapping fine-resolution microclimate in grassland ecosystems. Although there are challenges with the use of climate loggers in open systems, these data suggest potential for the management of grassland microclimates to buffer some species from extremes. However, field study showed that grassland-dependent birds often prefer specific vegetation structures for nesting that may limit their ability to access cooler microclimates. Effective conservation strategies must balance vegetation management to improve microclimates for species while also accommodating the natural behaviors and habitat preferences of habitat specialists.

Workshops facilitated collaboration between researchers and practitioners, bridging the science-to-action gap. The Nature Conservancy demonstrated the success of this approach by using the menu to create a climate adaptation plan for the Samual H. Ordway prairie.

NEXT STEPS

- Identify future research opportunities that address emerging knowledge gaps and needs as partners implement strategies from the Grassland Adaptation Menu.

PARTNERS

- See online for full list of partners
- For more information, contact Jacy Bernath-Plaisted: bernathplais@wisc.edu

Read the full Case Study: