

# Influence of Grassland Type on Arthropod Biomass and Diversity

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## INTRODUCTION

Grassland ecosystems are among the most threatened worldwide and, in the US, >50% of grasslands (339 million acres) have been converted for other uses as of 1992<sup>1</sup>. Meanwhile, North American grassland bird species have also declined 25-65% from 1980-1989<sup>2,3</sup>.

**Arthropods** are a group of invertebrates with an exoskeleton, jointed legs, and a segmented body, and which include insects, centipedes, millipedes, arachnids, and crustaceans. Arthropods are important for grassland ecosystem function because they pollinate flowers, break down organic matter, and provide a food source for wildlife, notably grassland birds<sup>3,4</sup>.



Previous research demonstrates that habitats with more plant species can support a greater diversity wildlife, like arthropods and birds. **Native warm-season grass (WSG)** fields typically more plant species diversity and structural complexity than **non-native cool season grass (CSG)** fields.

**Does the taxonomic diversity, biomass, or nutritional quality of arthropods in a warm-season grass field differ from that of an adjacent cool-season grass field?**

## METHODOLOGY

On three occasions between June and October 2018, we collected arthropods from six points located in two fields (one WSG, one CSG) at Oxbow Farm in Warren County, VA. Volunteers used sweep-nets to capture arthropods perched on vegetation along two, 50-meter transects.

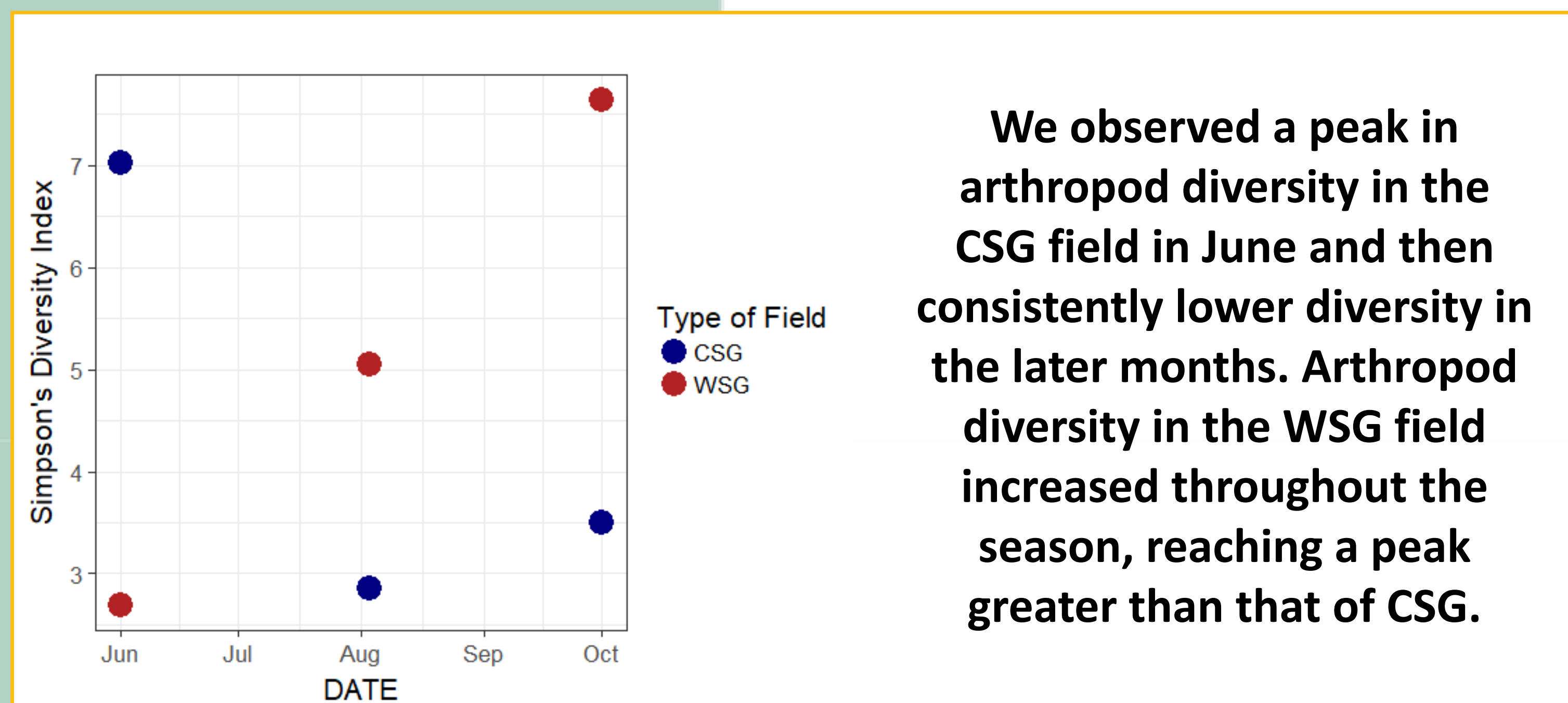
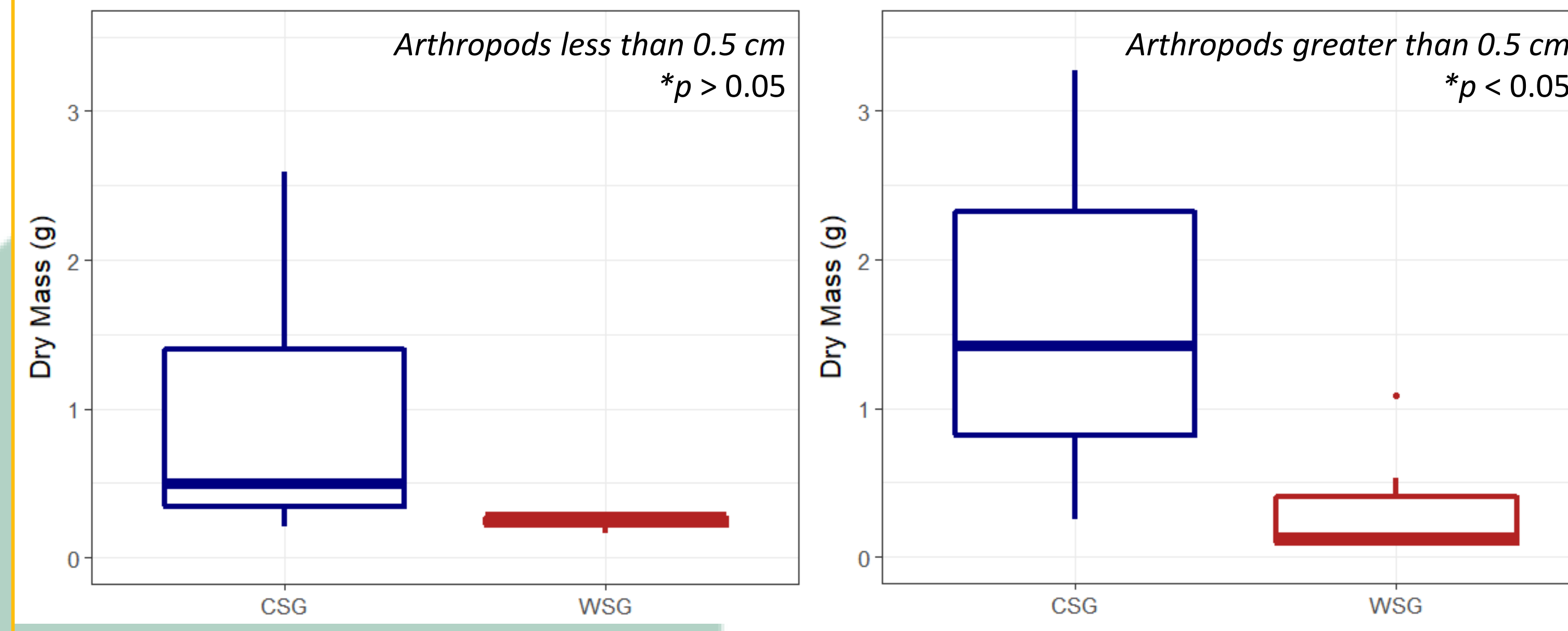
In the lab, we sorted arthropods by size and taxonomic Order, identified two of the most abundant groups to Family, measured wet and dry biomass, calculated diversity indices, and performed nutritional analyses.



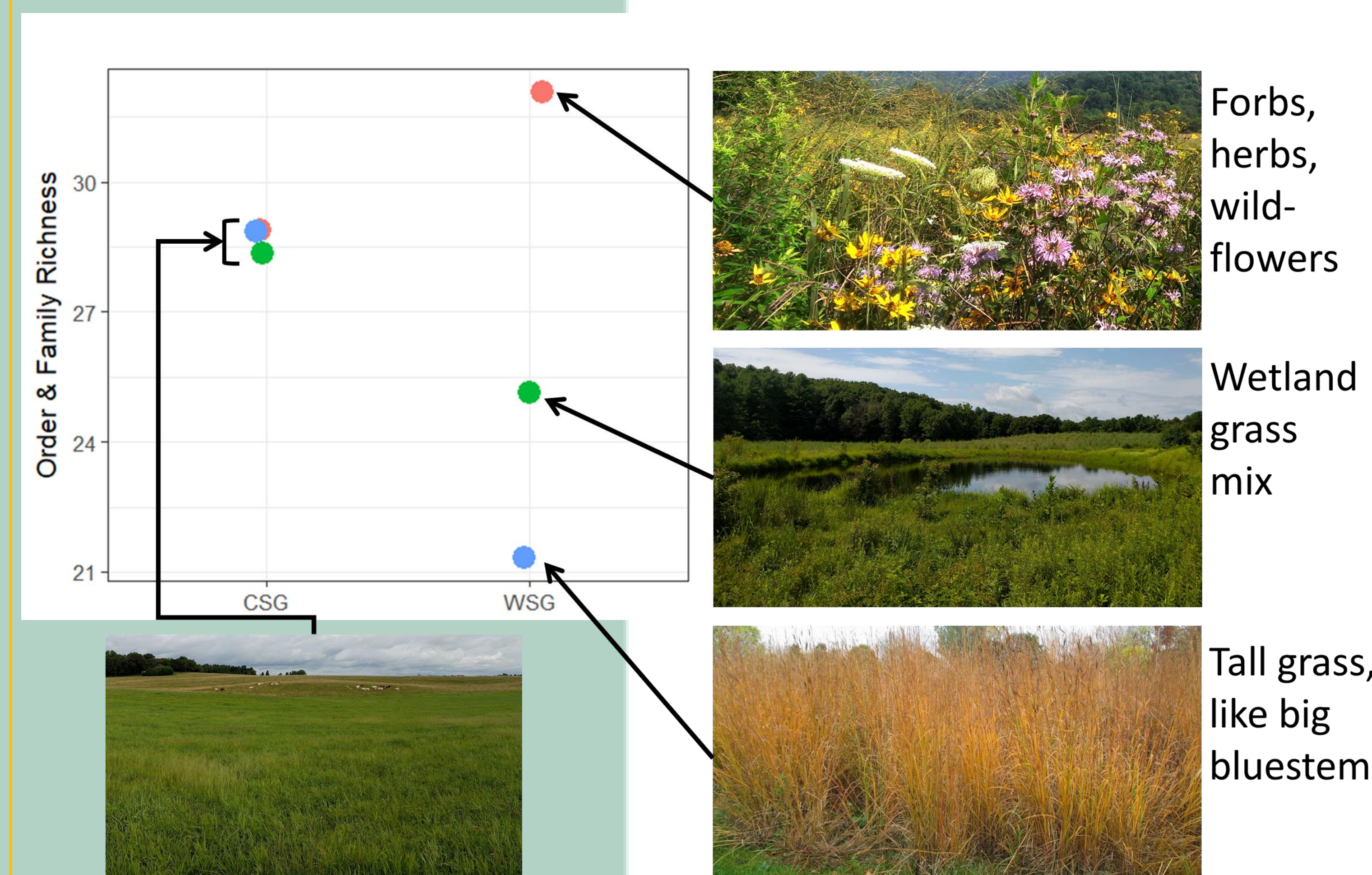
Marking transects in the WSG field. Photo by Katie Russell.

## RESULTS

**We found overall greater biomass of large (>0.5 cm), but not small (<0.5 cm), arthropods in the CSG field. We also noted greater variation in the biomass of insects in the CSG versus WSG field.**



**On the other hand, we noted a large amount of variation in the number of unique arthropod Orders and Families in the WSG but not CSG field.**



## DISCUSSION

We found that the WSG field generally had greater arthropod diversity, but this difference varied over time and between points. We also found greater arthropod biomass in the CSG field.

We believe these differences can, in part, be explained by differences in the timing and vigor of grass growth and plant diversity within and between fields.

While the CSG field consisted of a grass monoculture and exhibited a similar arthropod richness across sampling points, the WSG field had a variety of plant mixes and richness varied. The CSG had greater diversity early in the season, which could reflect the earlier peak growth of cool season grasses, while the greater biomass could reflect the earlier boost in productivity of cool-season grasses.

**The key conclusion we draw from this study is that seasonal and within-site variation of plant growth could be an important determinate in the value of fields for arthropods and birds.**



**MANAGEMENT IMPLICATIONS:** Grassland birds may utilize both WSG and CSG at different times of year or at different life stages. The close proximity of WSG and CSG fields may provide additional benefits to grassland birds<sup>5</sup>, and this question warrants further study in Virginia grasslands.



**NEXT STEPS:** Nutritional data analysis is ongoing as of March 2018.

At left, arthropod samples are being dried in the oven of the NZP nutrition lab, ultimately to be analyzed for protein, fiber, total mineral content, and gross energy.

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