

# Effects of Fire Severity on the Diversity of Arthropods in Pinelands Ecosystems



Julia Defeo<sup>1\*</sup>, John Dighton<sup>1</sup>, Angélica L. González<sup>1</sup>, Michael R. Gallagher<sup>2</sup>, and Alexis Everland<sup>3</sup>



<sup>1</sup>Department of Biology, Rutgers University – Camden, <sup>2</sup>US Forest Service, <sup>3</sup>Tall Timbers Research Station

\*Corresponding Author; Contact: julia.defeo@rutgers.edu

## Introduction

- Intermediate Disturbance Hypothesis (Connell 1978) predicts maximized species diversity at moderate disturbance regimes
- Frequency, intensity of wildland & prescribed fire events increasing due to climate change
- How does fire disturbance affect taxonomic and functional diversity of soil-dwelling arthropods?
- This project: **analyze taxonomic, functional diversity of arthropods in NJ Pinelands to describe community response to fire-severity gradient**

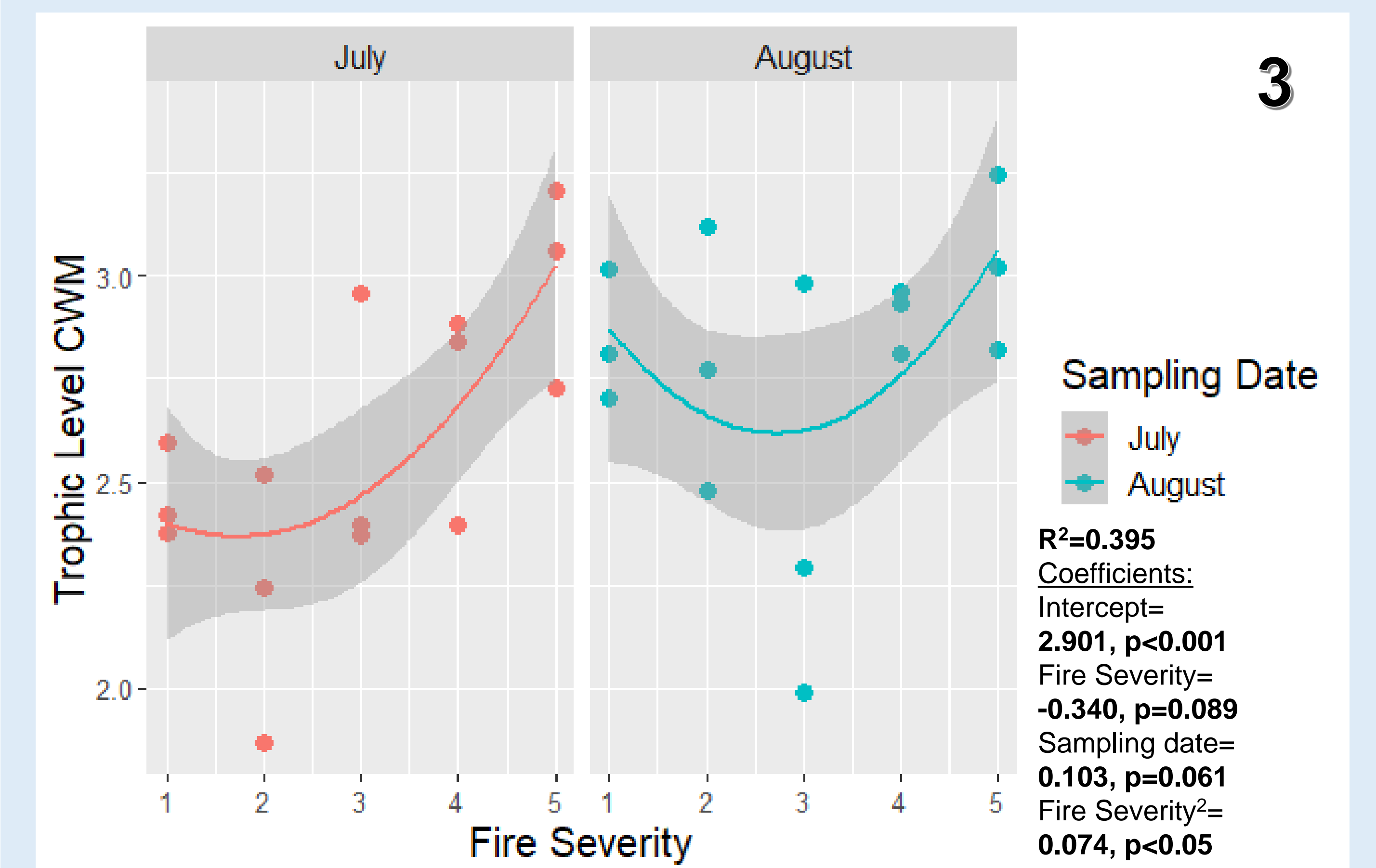


## Materials and Methods

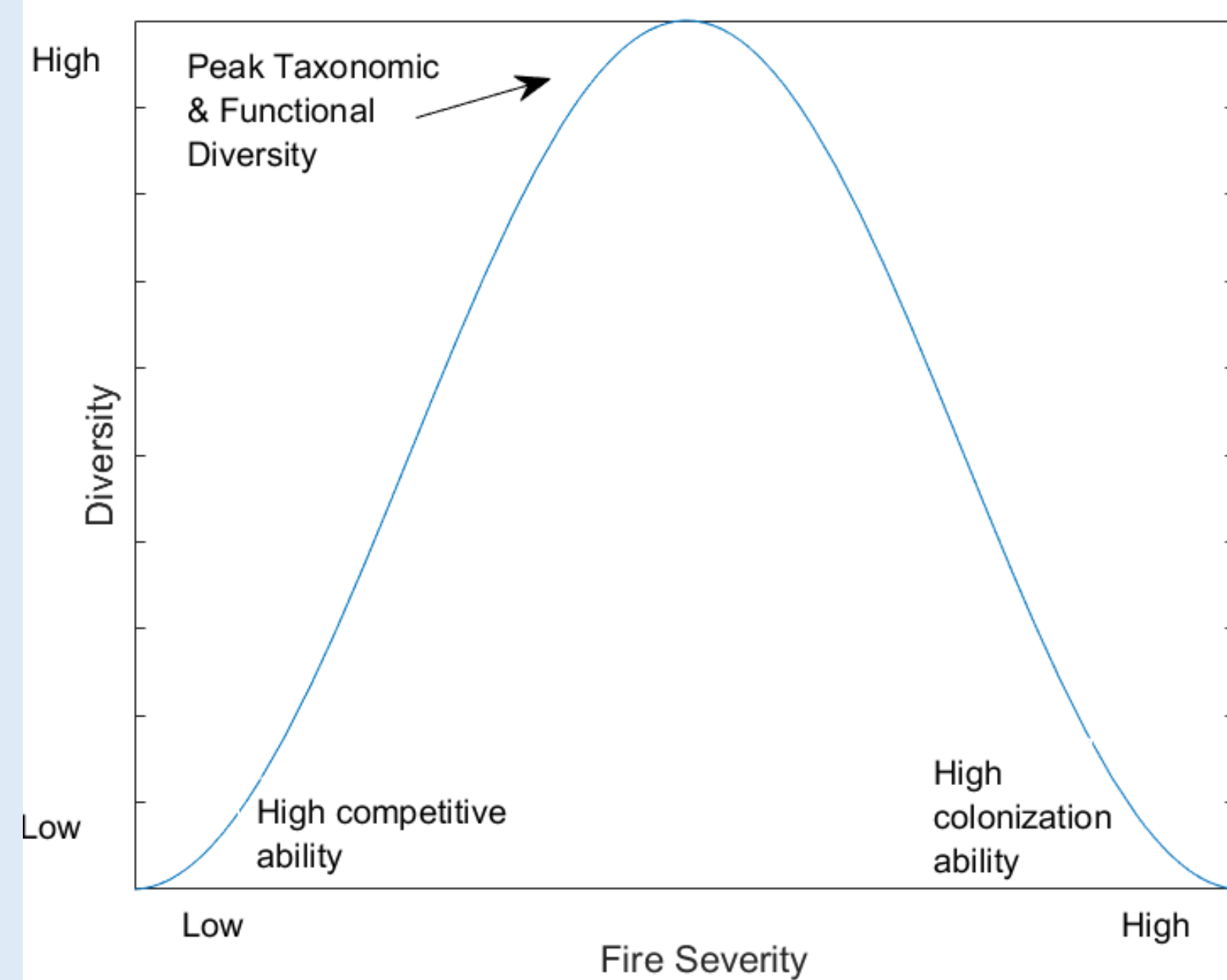
- Arthropods sampled via pitfall traps in July, August 2020
- Plot Characterization: Litter depth, N/C, moisture, temp
- Morphospecies ID
- Functional Trait ID: Body Size, Trophic Guild



## Results cont.



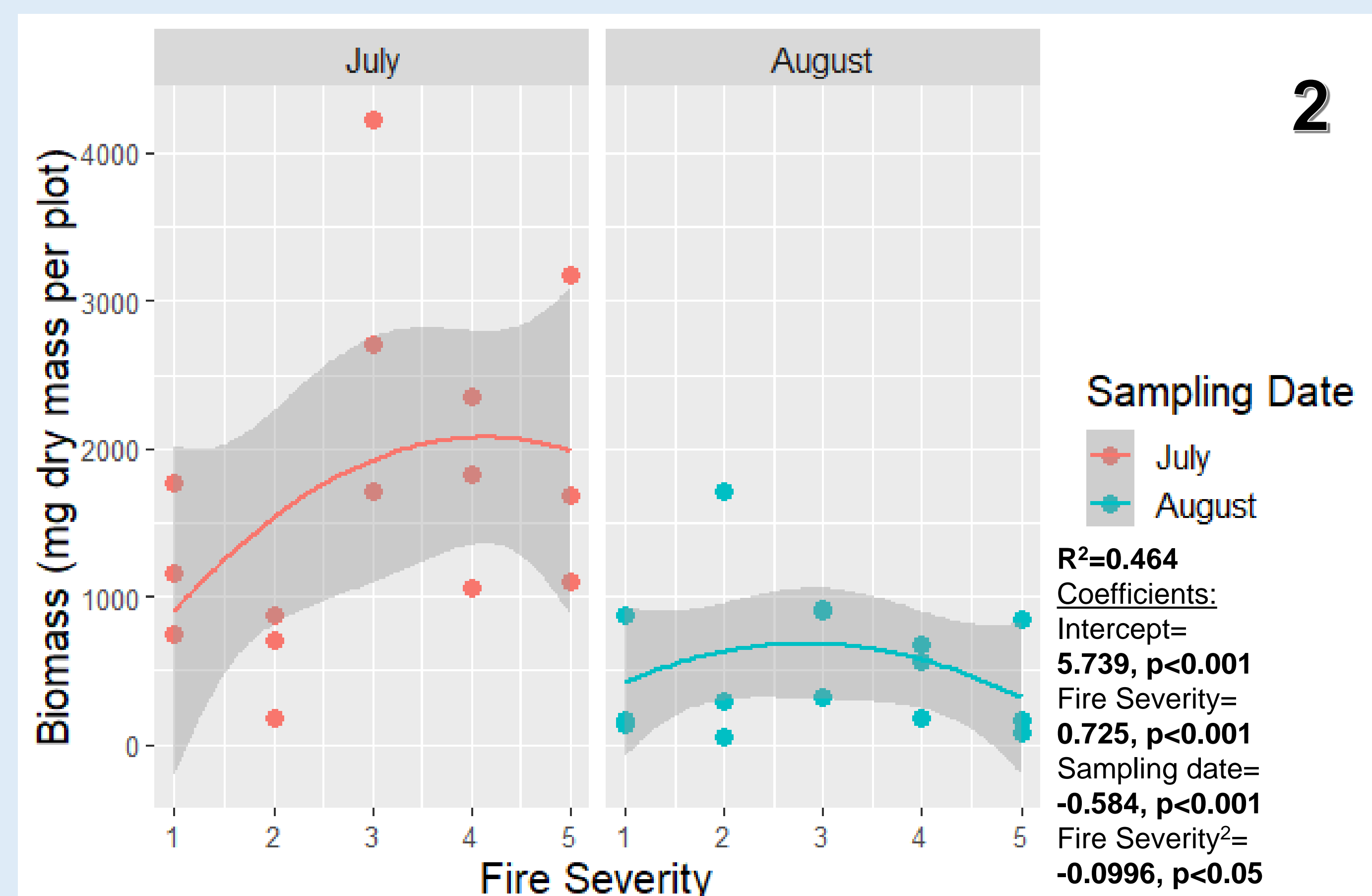
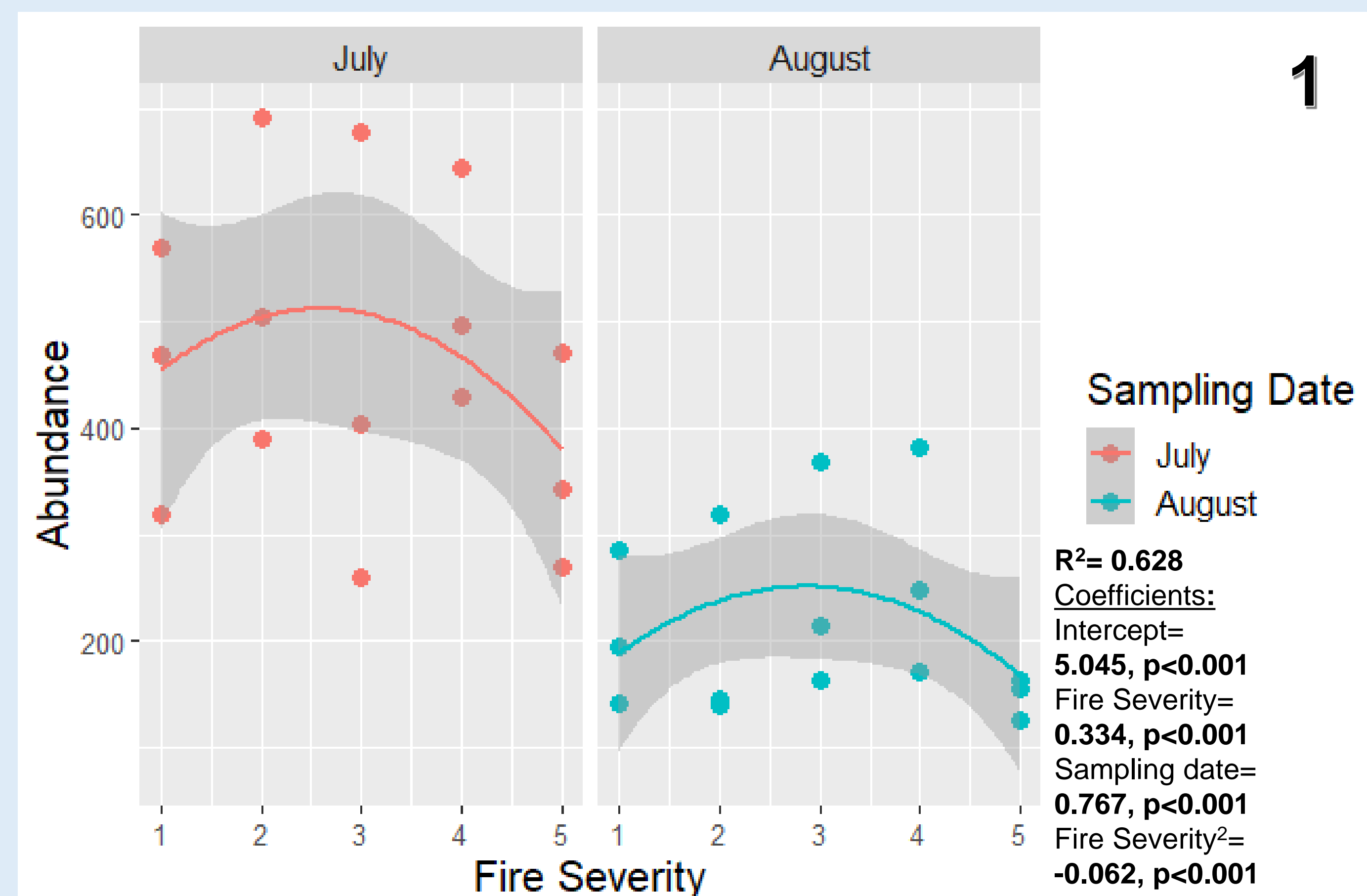
## Hypotheses



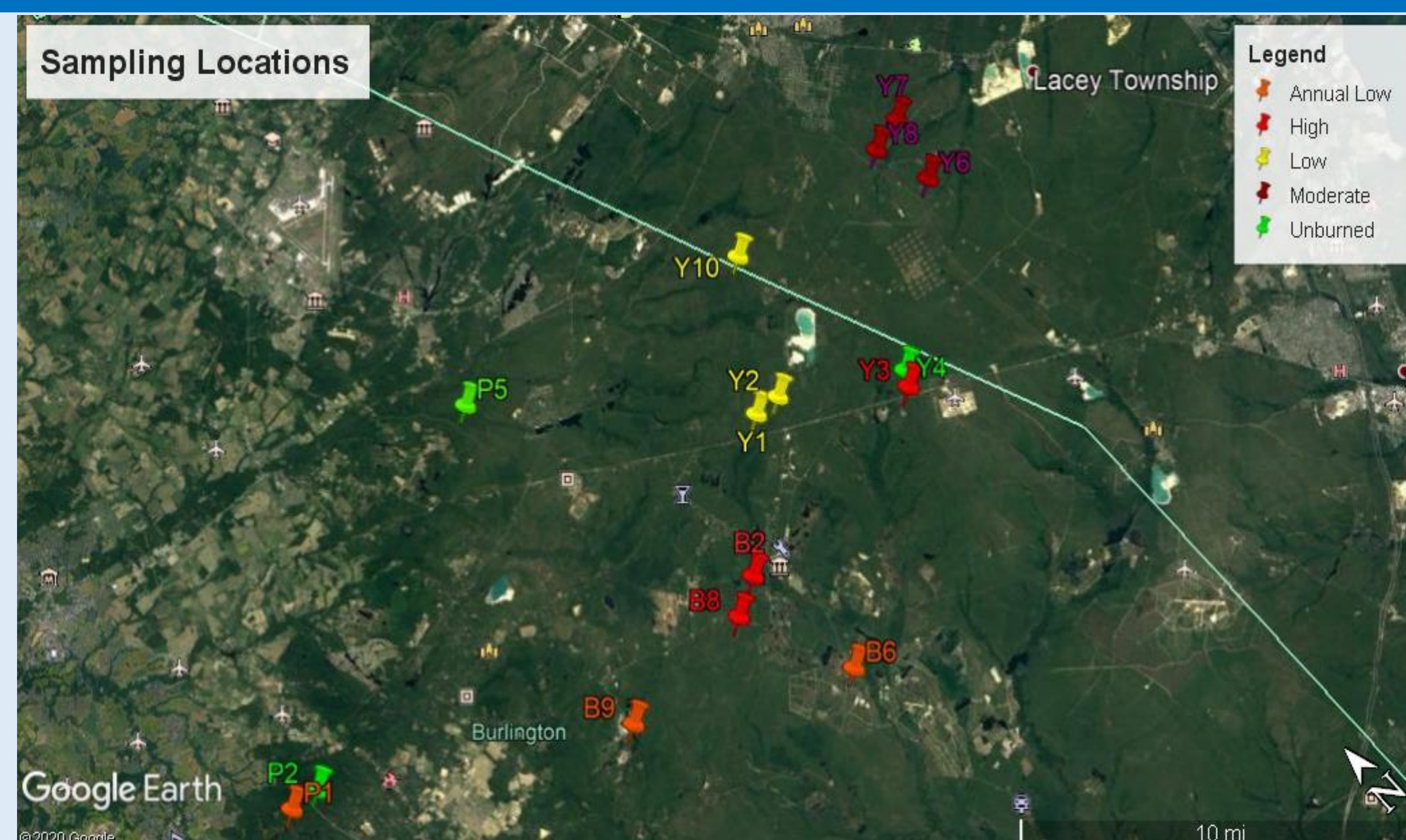
H1: Moderate fire disturbance will favor high taxonomic and functional diversity of soil-dwelling arthropods in NJ Pinelands;

H2: Species functional traits will be significant drivers for post-fire community assemblage

## Results



## Study Area



15 field sites in NJ's Pinelands National Reserve  
Sites represent gradient of fire severity

## Discussion

### Based on model results:

- Moderate fire disturbance correlates with maximized arthropod abundance & biomass, more equal distribution of trophic roles
  - Species richness negatively correlated with severity
  - Moderate disturbance likely reduces predator frequency, increases resource availability for lower trophic levels



- Results support hypothesis that intermediate levels of disturbance support greater taxonomic, functional diversity

**Future work:** further characterize shifts in taxonomic and functional diversity in response to fire frequency, instead of severity



## Acknowledgements

- Sandy Stewart Undergraduate Research Grant
- Ralph E. Good Award for Excellence in Pinelands Research
- New Jersey Space Grant Consortium Fellowship Program
- Joint Venture Agreement between US Forest Service, Northern Research Station and Rutgers University

Special thanks to New Jersey Forest Fire Service, Tom Gerber, Sam Moore and Steven Lee for land-use permission, and Steve Schulze, Jennifer Le, Dr. Eric Klein, & the González Lab for guidance and critique during the development of this work.