

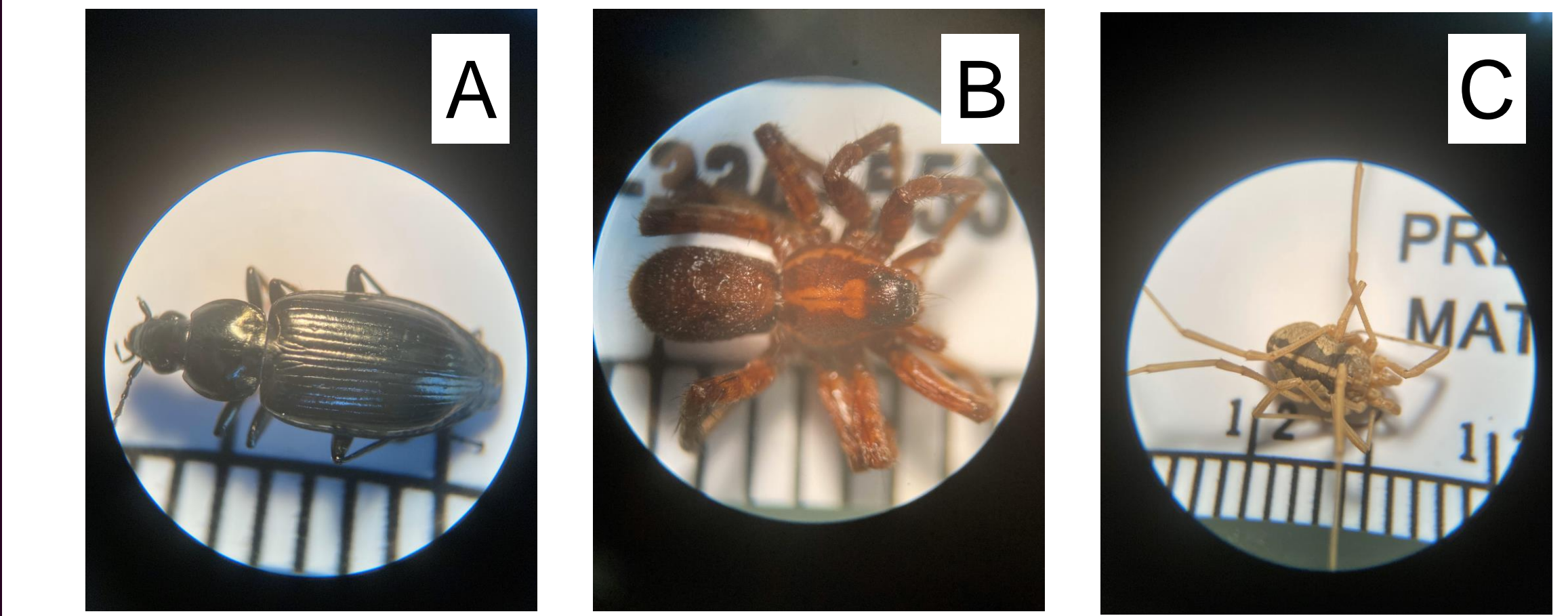
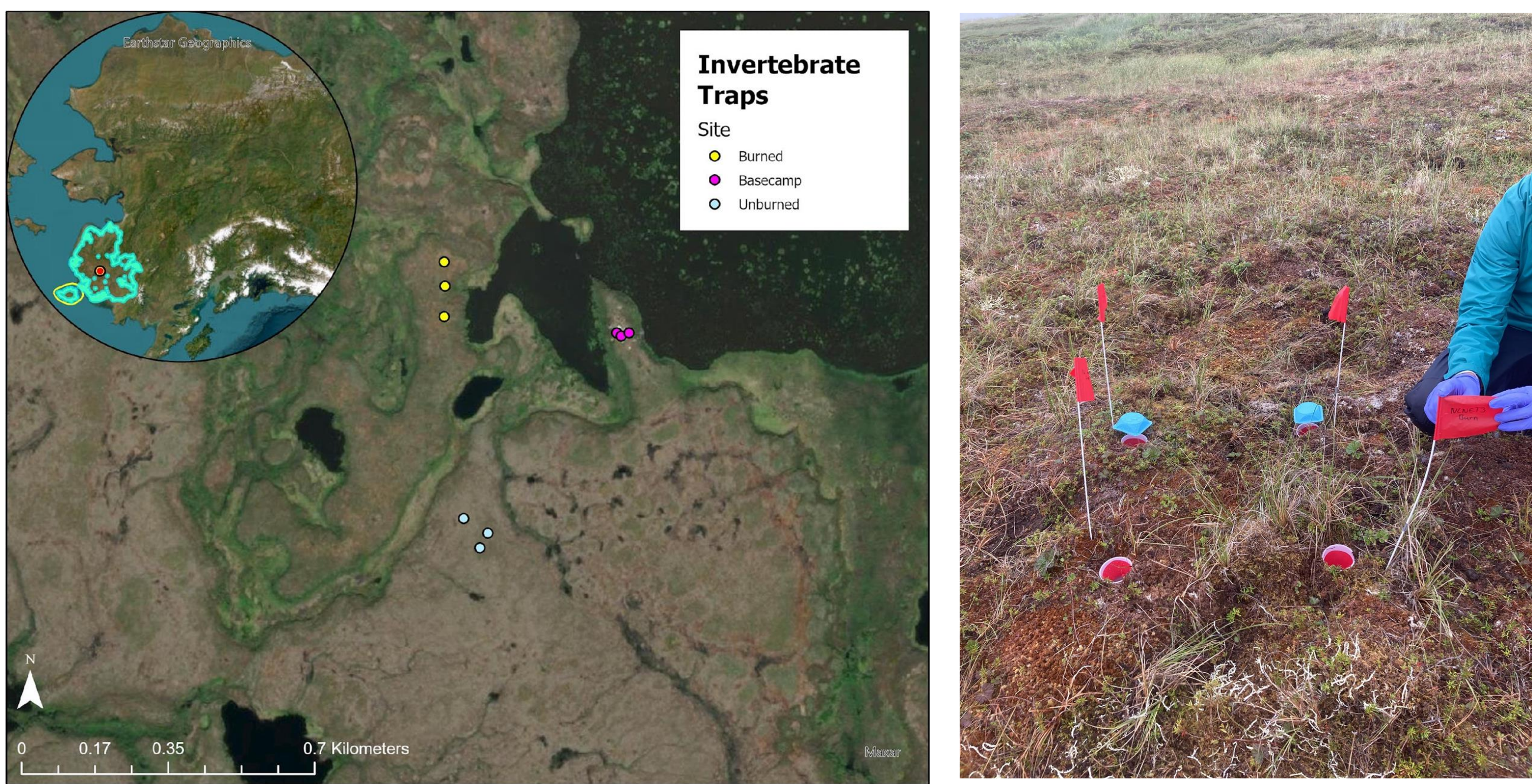
Exploring The Effects of Human Disturbances and Tundra Fires on Terrestrial Invertebrate Abundance and Diversity

Jordan McDavid¹, Nigel Golden², Sue Natali², Logan Berner³, Gabriel Duran⁴

¹Jordan.mcdavid@spartans.ut.edu; University of Tampa, ²Woodwell Climate Research Center, ³Northern Arizona University, ⁴University of Quebec in Montreal

Introduction

- Terrestrial invertebrates play a vital role in ecosystem function and demonstrate a more rapid response to ecological changes compared to vertebrates. For these reasons, they can be used as good indicators of an ecosystem's response to ecological disturbances.
- This study aims to quantify how the presence of tundra fires as well as direct human impacts affects the abundance and diversity of terrestrial invertebrates.



The 3 most common invertebrates across sites (Figure 1).
Invertebrate A: *Pt. melanaris*
Invertebrate B: *Tr. terricola*
Invertebrate C: *R. triangularis*

Methods

- Invertebrate traps were constructed with and without ethanol, and with or without a weigh boat cap. (4 different traps)
- At each site—camp (human disturbance), unburn, and burn (2015 fire)—3 sets of 4 traps were set on each corner of a 1 m² quadrat (total of 36 traps) and sampled twice per day (July 2023) for invertebrates.
- Samples were stored in scintillation vials containing ethanol and later identified using iNaturalist.
- Percent vegetation cover was recorded during deployment. Soil moisture (%) and temperature (°C) were recorded at each quadrat at each sample interval.



Results

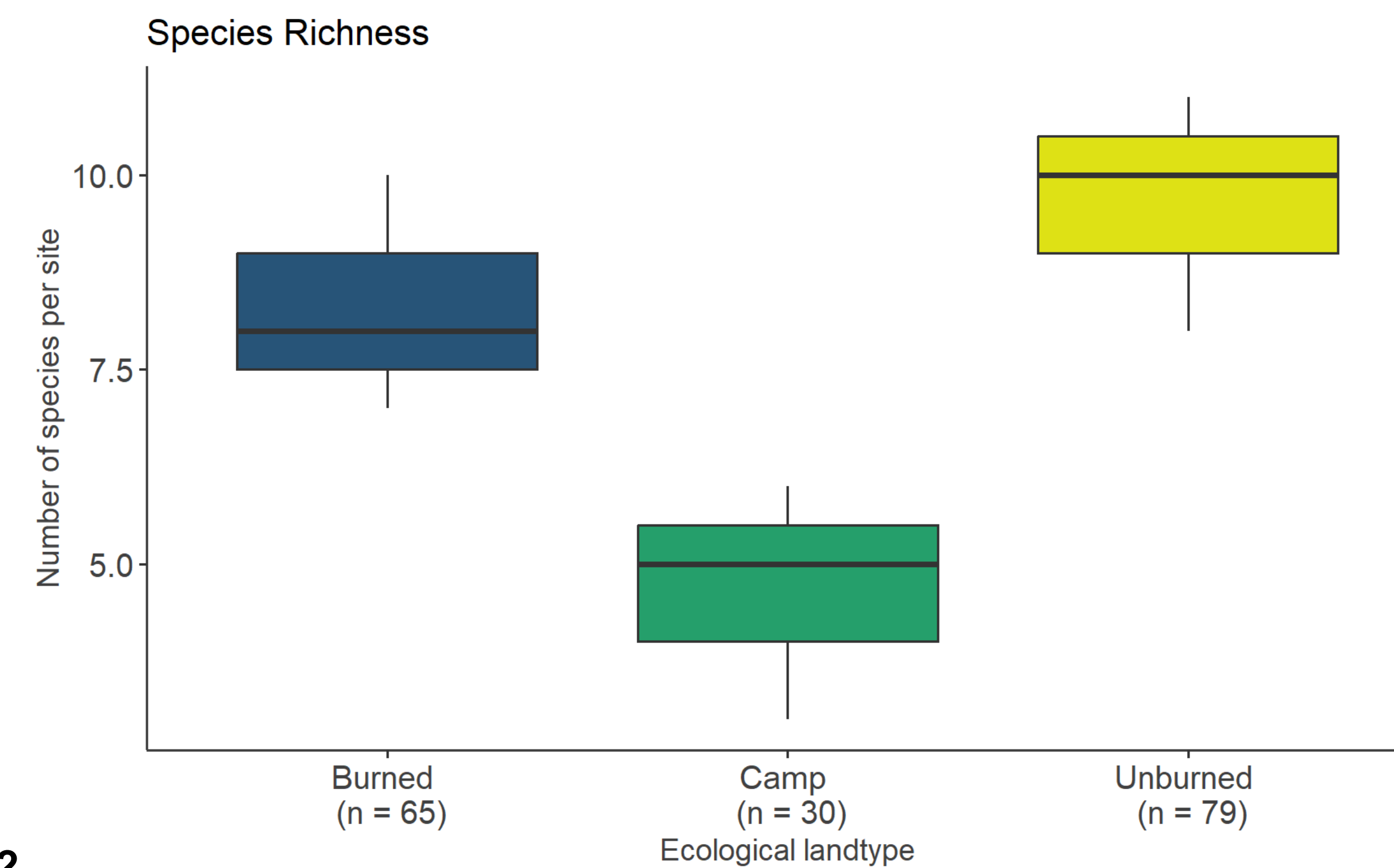
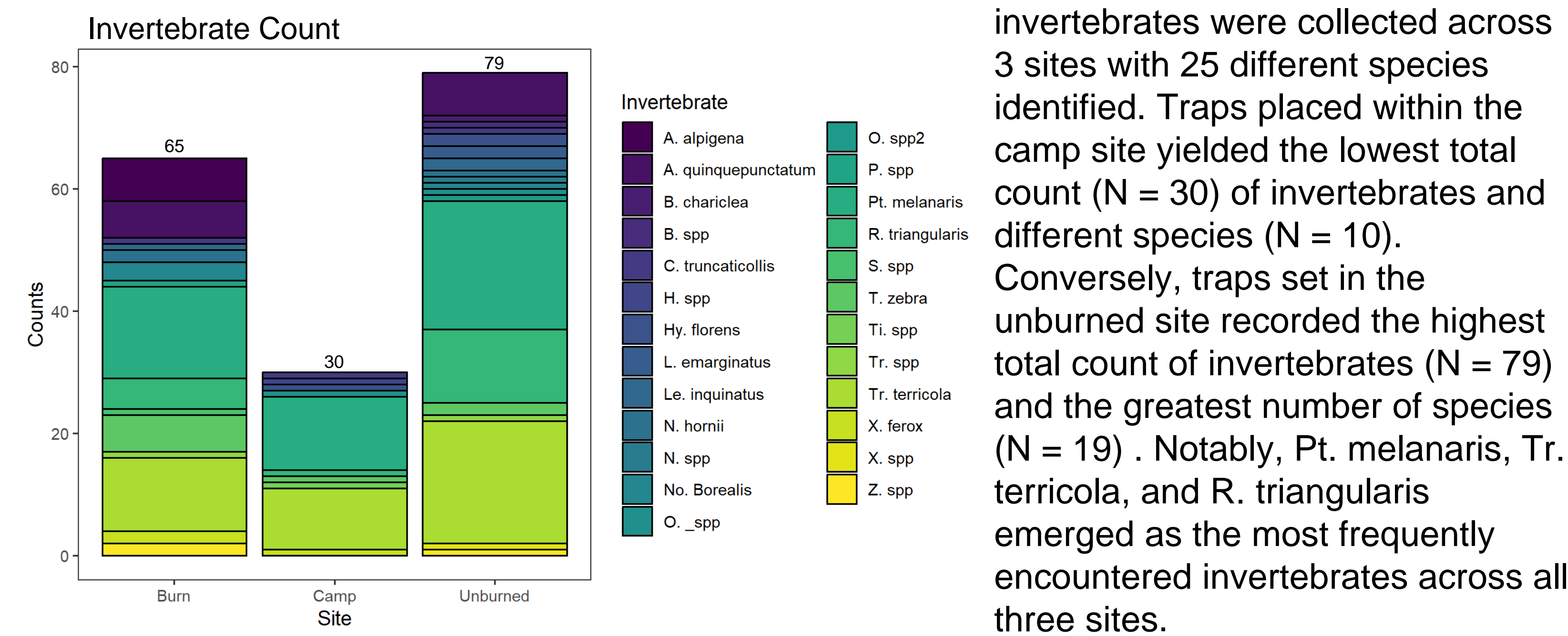


Figure 2

The species richness across land types were found to be significant using an analysis of variance ($p = 0.0172$). Using a perMANOVA the species composition across land types was found to be significant as well as ($p = 0.039$). The unburned sites had the highest range of species (median = 10), followed by the burn site (median = 8), and the camp sites with the lowest (median = 5).

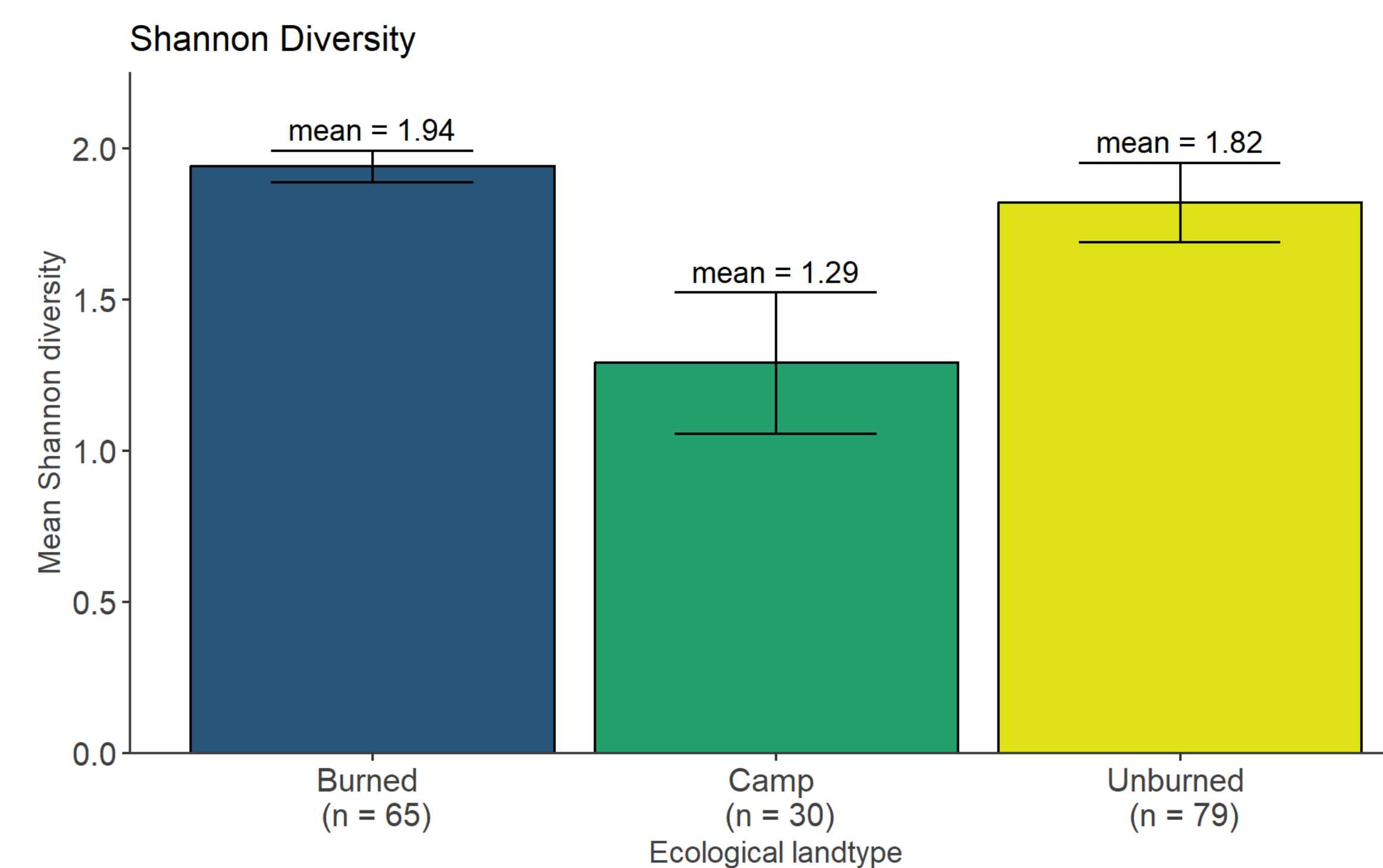


Figure 3.

The diversity across the landscapes were found not to be significant using an analysis of variance ($p = 0.549$). The burn sight had the highest mean diversity (mean = 1.94) but the lowest variance. The unburned site had a mean diversity (mean = 1.82) and variance in-between the burned and camp sites. The camp site had the lowest mean diversity (mean = 1.29), but the highest variance.

Summary/Discussion:

- The high presence of, *Pt. melanaris*, *Tr. terricola*, and *R. triangularis* across all land type could be indicative of their high abundance or their susceptibility to the trapping methods (Figure 1).
- Higher species richness in sites that had not experienced tundra fires or anthropogenic disturbances implies that these ecological disturbance affect species richness of invertebrate communities. This provides us insight regarding the response of the ecosystem (Figure 2).
- The lack of significance in diversity combined with the presence of significance in species richness and composition implies that while these disturbance may affect how many species there are in a given land type, they don't affect the relative abundance of each species (Figures 2-3).

Future Work

- More replicates would provide a better set of data
- Explore potential interaction between trap characteristics and fire on invertebrate abundance and diversity
- Explore impacts of plant and soil characteristics on invertebrate abundance and diversity.
- Future work could explore invertebrate abundance and diversity in older burns.

Acknowledgments: The research for this project was conducted on the land of the Yup'ik people, the land that the Woodwell Climate Research Center used to conduct its research is the land of the Mashpee Wampanoag Tribe. I would like to thank the Polaris 2023 Cohort for their support kindness and sense of community. I am extremely grateful to my mentors, who guided and taught me: Nigel Golden, Sue Natali, Logan Berner, and Gabriel Duran. Finally, I'd like to thank NSF-1915307 for providing the financial support that made this project a possibility.