

Recovery of Above Ground Biomass After the 2015 Fire Season in the Yukon-Kuskokwim Delta, AK

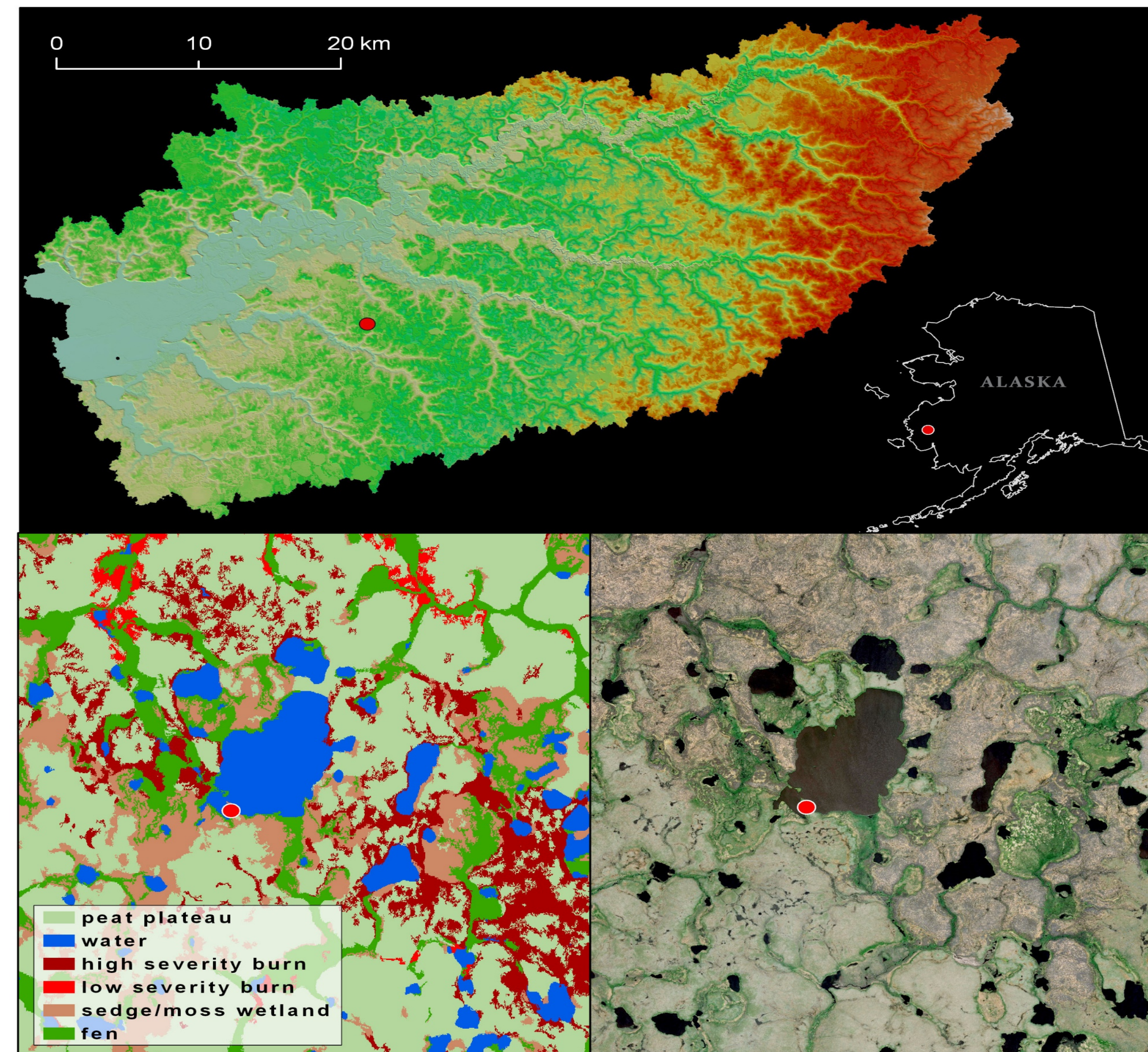
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Introduction

The increasing frequency of wildfires in the Arctic continues to exacerbate changes in the active layer thaw, soil temperature, and plant community structure. Due to its ability to sequester carbon, above ground biomass plays a key role in the net ecosystem exchange of carbon to the atmosphere. In the summer of 2018, we tested the hypothesis that fire causes significant change in plant species and functional type composition by changing both biotic and abiotic conditions.

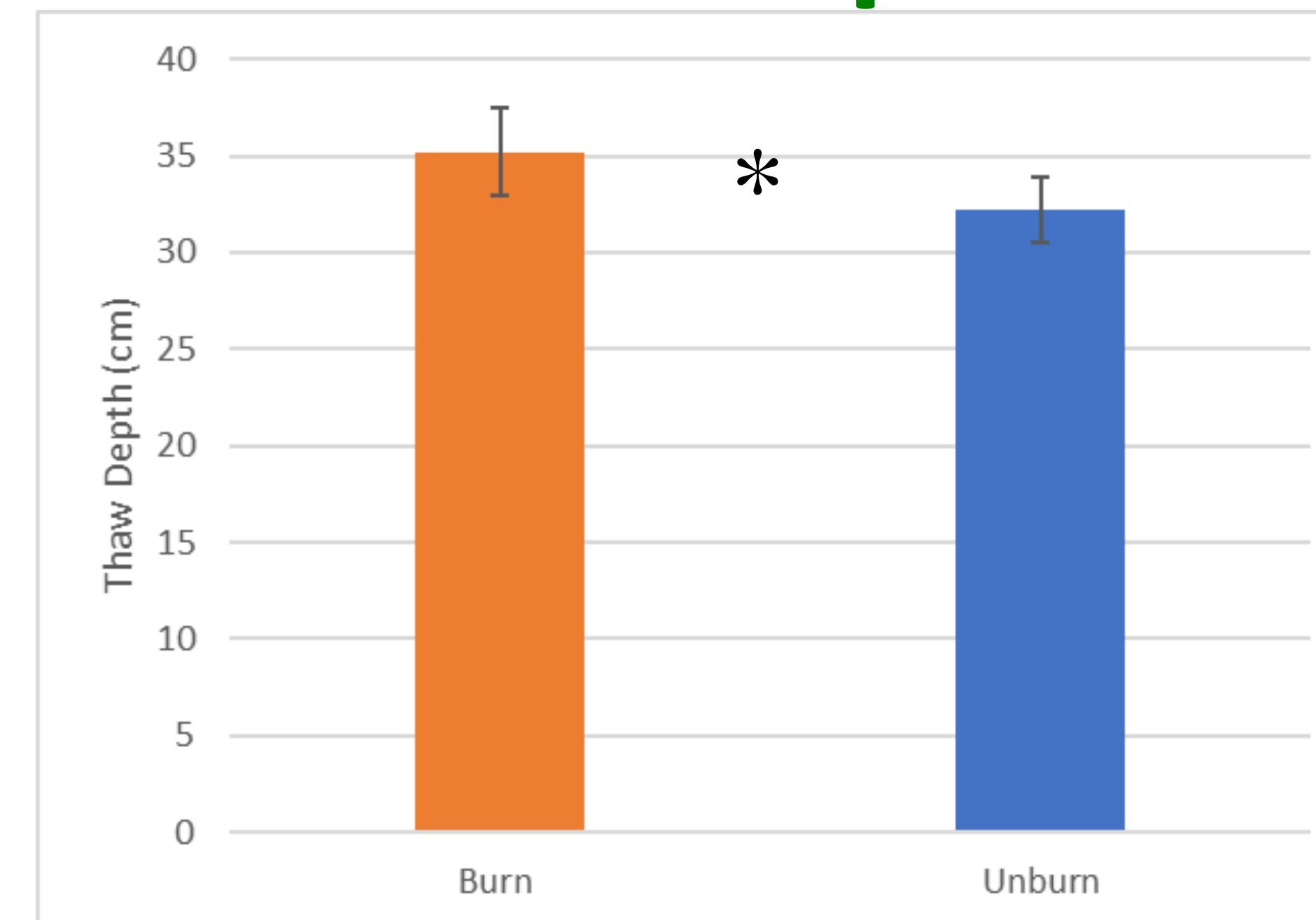
Study Area

We located 4 study sites within a 4-kilometer radius, about 60 miles Northwest of Bethel, Alaska. This is a tundra ecosystem in the subarctic portion of the cryosphere. All four study sites included two areas, one that burned during the 2015 fire season, and a corresponding unburned area.



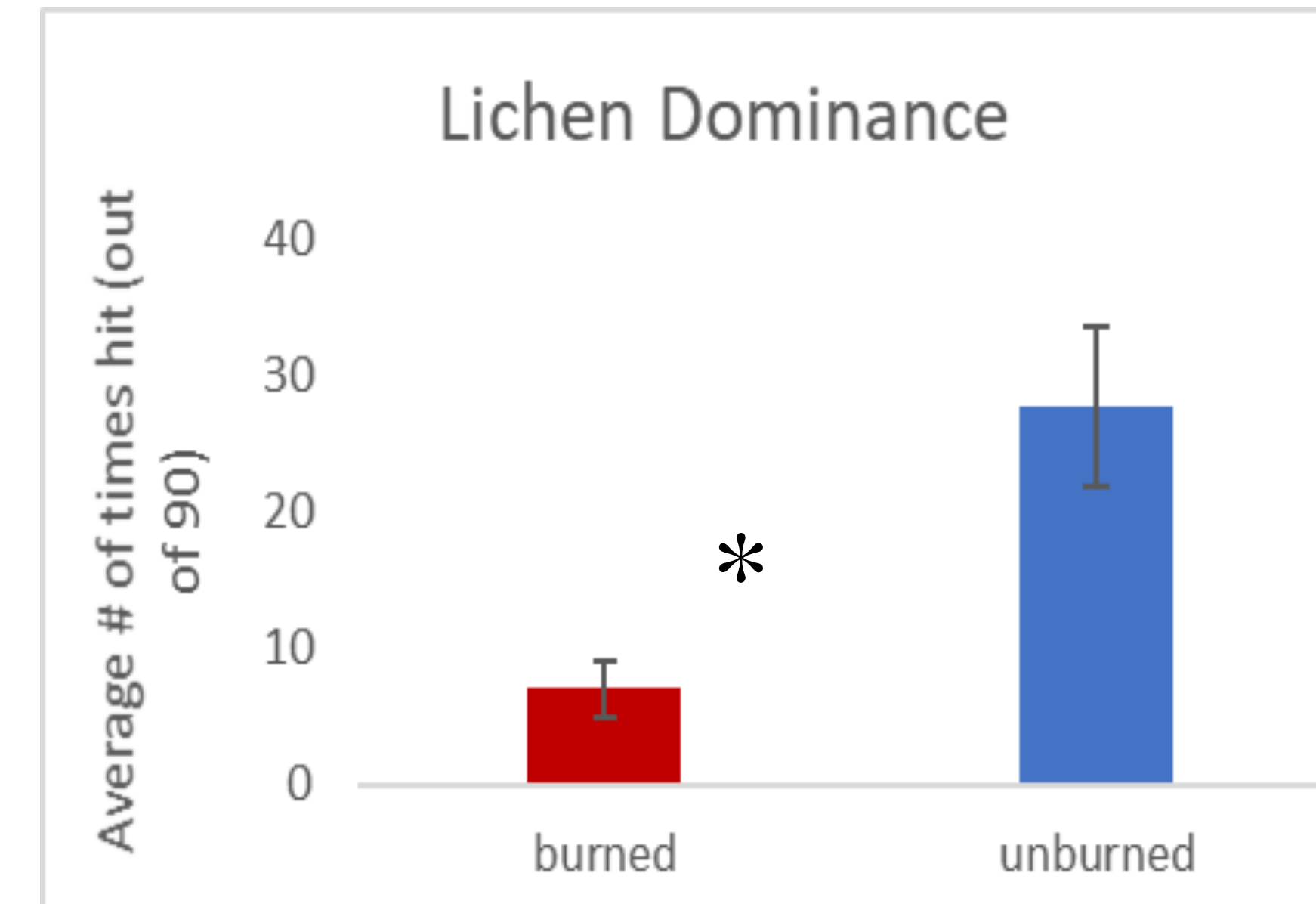
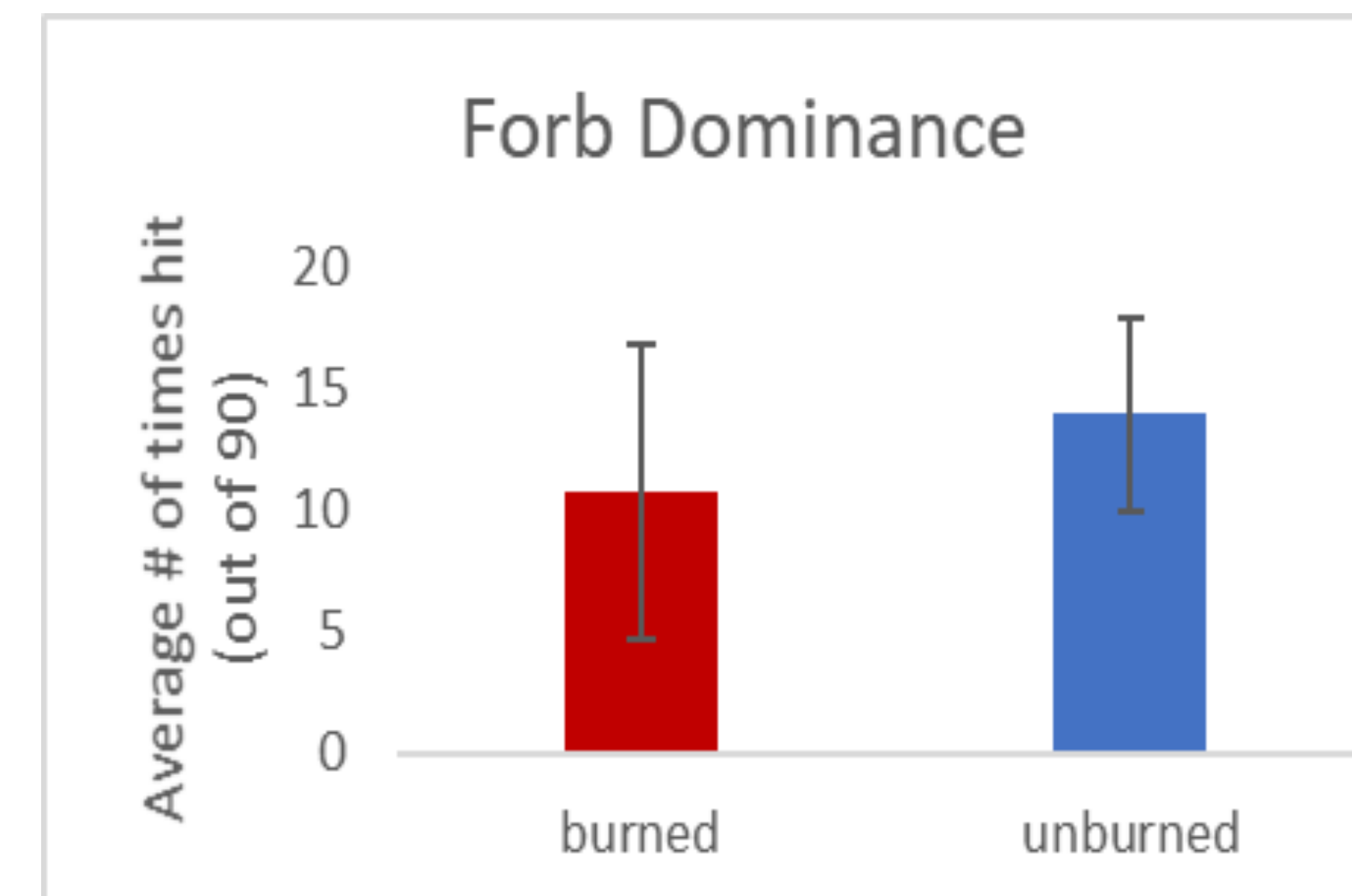
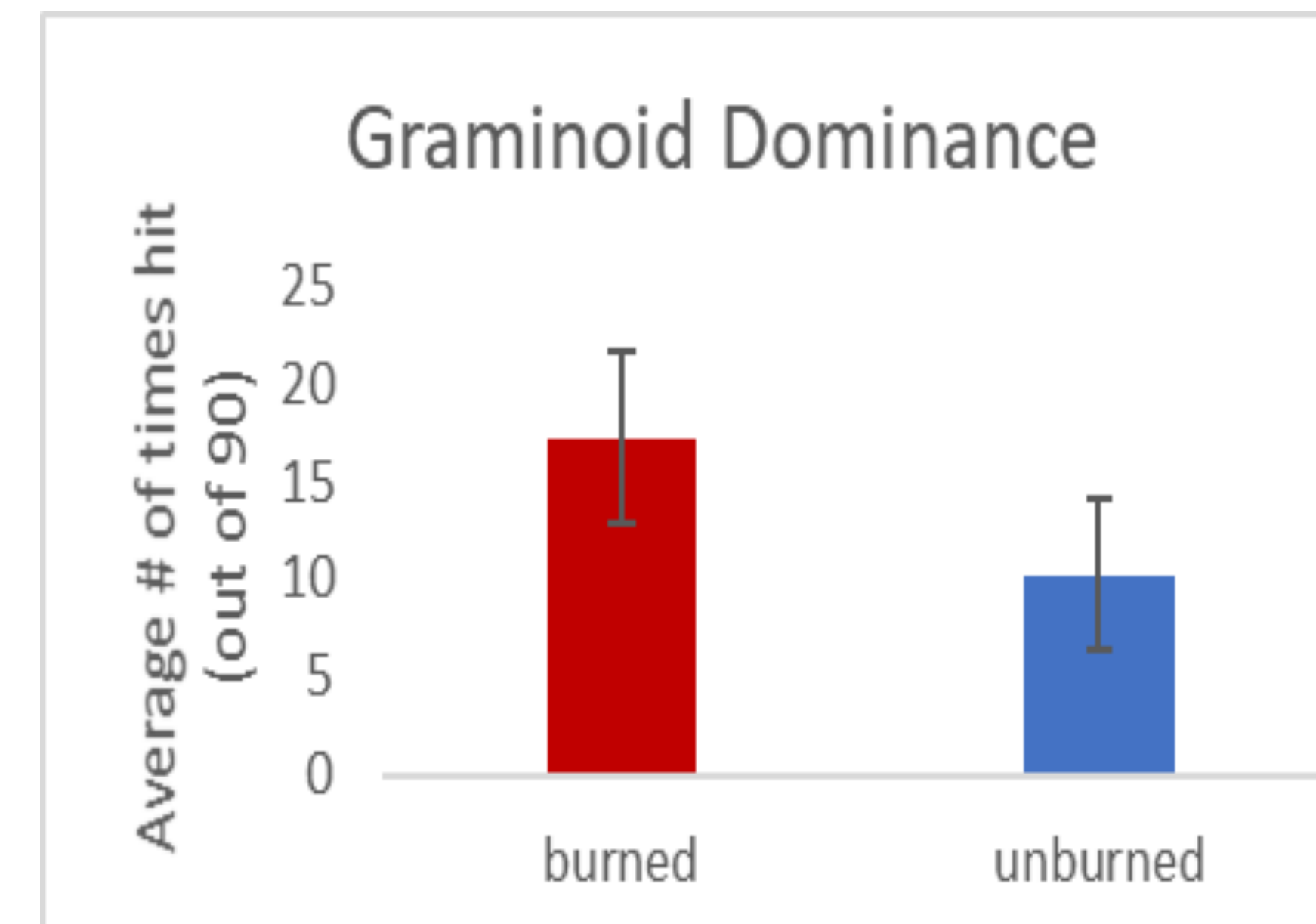
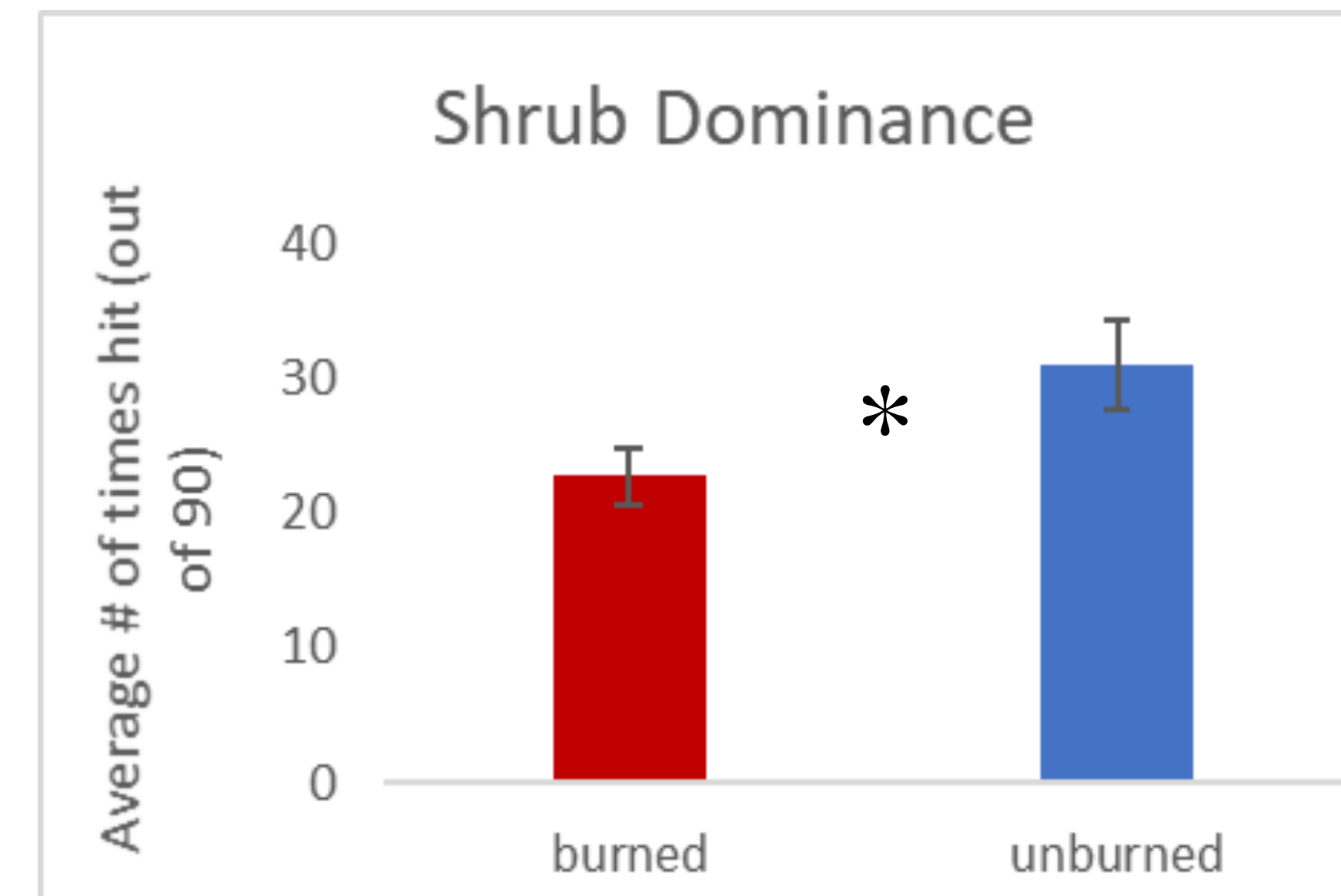
Maps made by Greg Fiske

Thaw Depth

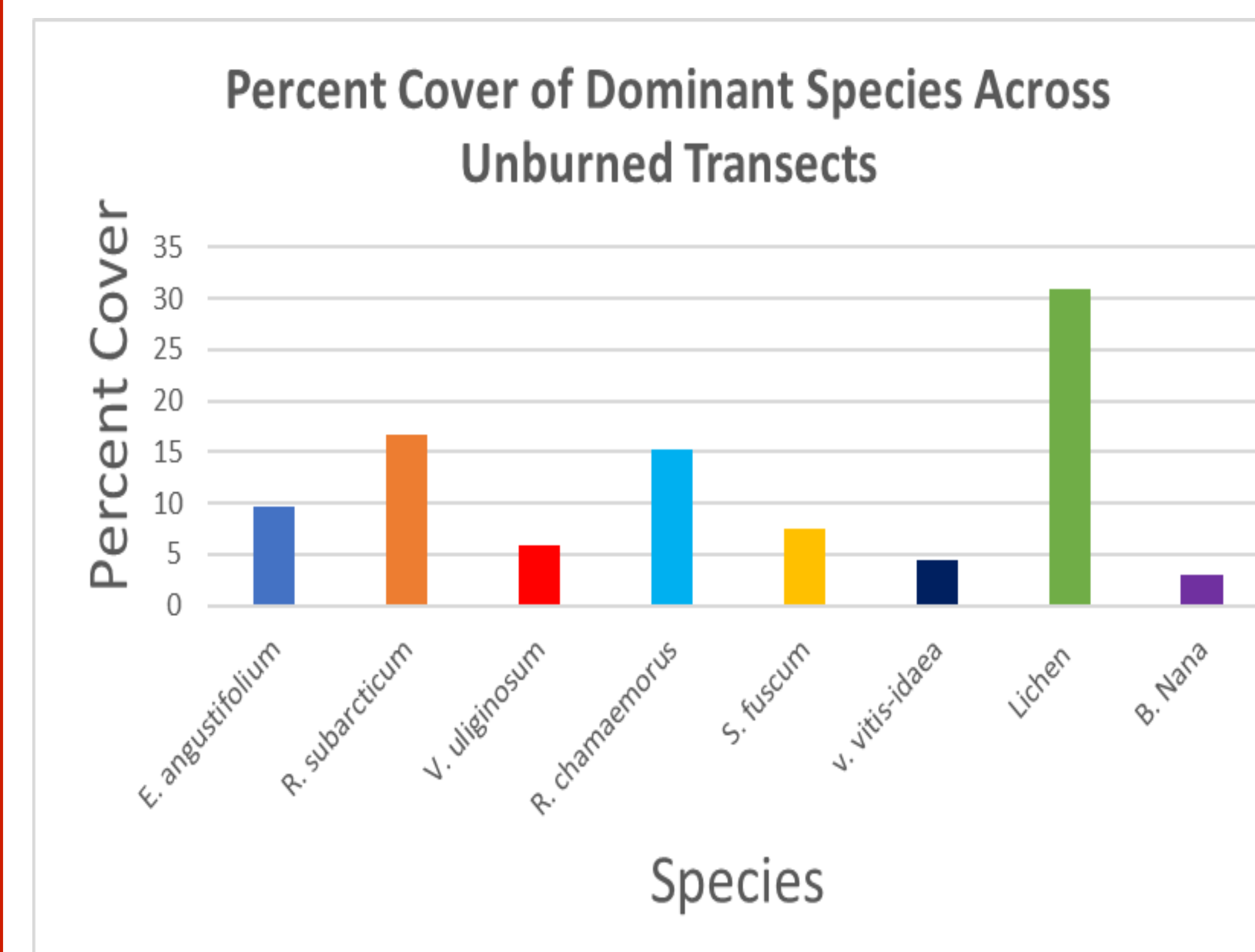
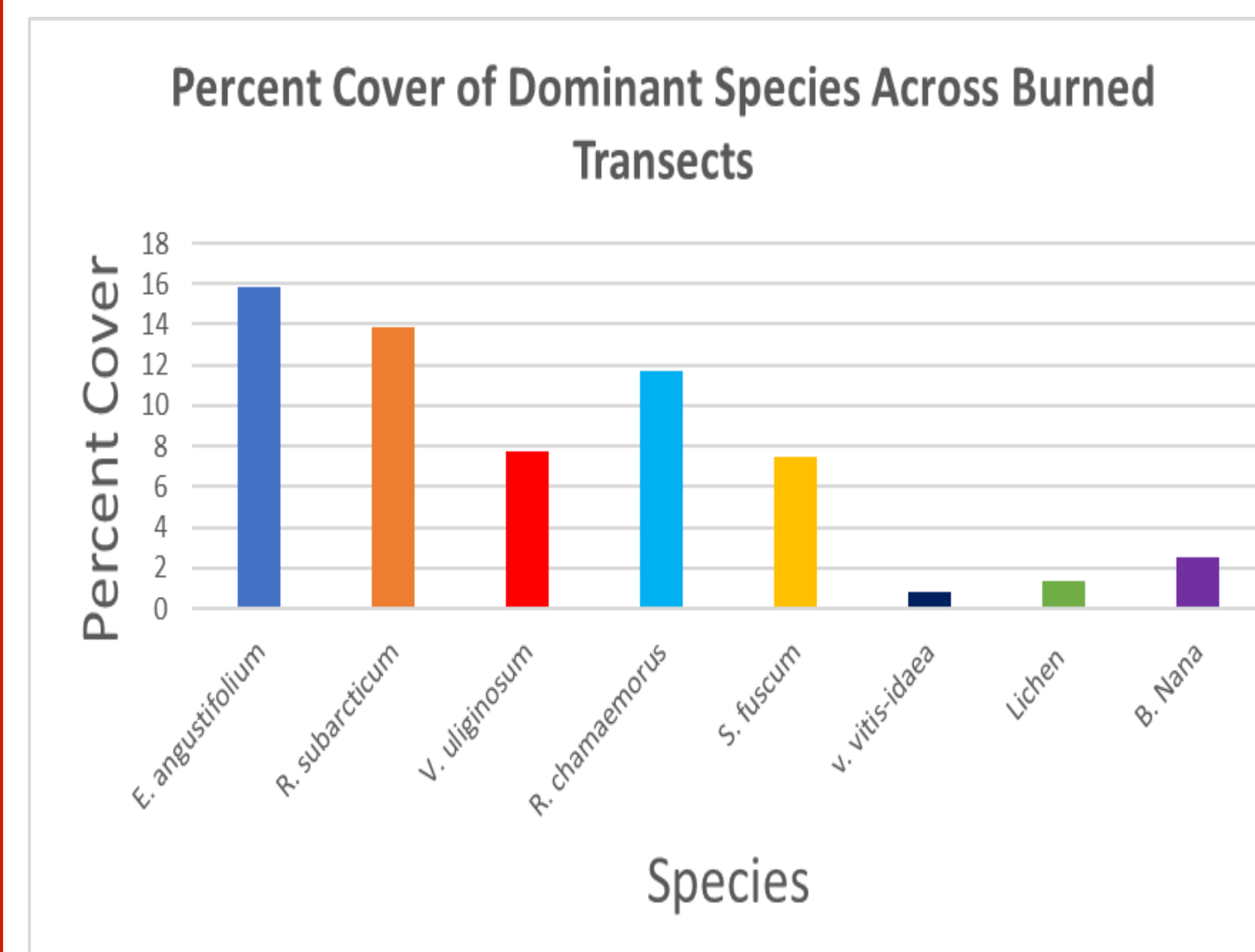


Mean thaw depth across burned and unburned areas (taken at 20cm depth in early to mid July)

Functional Type Dominance



Species Percent Cover



Linder, Chris (2018)

Discussion

Previous research highlights a pattern of shrub dominance occurring in burned areas, starting several years after the occurrence of the burn. Our data, taken 3 years post-burn, indicate that shrubs do not return to their pre-burn level of abundance immediately following fire. Our observations may reflect that:

1. Shrubs act as a fuel source and increase burn intensity, thereby increasing burn depth and the necessary time for biomass recovery.
2. Shrubs have a slow growth rate and therefore cannot sequester burn-released nitrogen and other nutrients relative to faster growing functional groups.

Conclusion

Tundra fire results increased ground thaw. Additionally fire changes the plant functional community structure by reducing lichen and shrub dominance in the community, niches that may be at least partly filled by graminoids.

Acknowledgements

Primary funding for this research was provided by the National Science Foundation through a grant awarded to the Polaris Project (NSF-1624927). Additional funding was provided by the Hampshire College School of Natural Science. Photographs were taken by Chris Linder and maps were made by Greg Fiske. We would also like to acknowledge Max Holmes and the rest of the Polaris Project student participants for their contributions to our work.



Linder, Chris (2018)

Methods

We collected data on species and functional type of vegetation, thaw depth, and soil temperature. We set up three replicate 30m transects and took measurements at 1m intervals. Species and functional type data were collected by the use of the point intercept method, in which a pin is dropped and the species and functional type of the first plant hit is recorded.