Thesis-Schmesis

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# Abstract

# Introduction

Montane treeless areas, grassy and heath balds, exist globally and are characterized as being dominated by herbaceous vegetation or woody ericaceous species, respectively. It is theorized that balds originated over ten thousand years ago and are hypothesized to be maintained by grazing of large herbivores and some deliberate burning (Murdock 1968, Gersmehl 1970, Lenze 2015). According to Gersmehl (1970), true balds occur above 4,600 feet in elevation and can be characterized as follows; gently sloping but rarely greater than 20-degrees, often dominated by *Danthonia compressa*, forest encroachment is evident at the margins, relict trees are scattered in most areas, most are often sheltered on two or more sides by taller forest growth, soils are between 2 and 4 feet deep with high moisture content and organic matter, and at least one perennial spring is evident on the margin. Round Bald is a part of the Roan Mountain Massif and is located along the Appalachian Trail about 16 miles North of Bakersville, North Carolina and 14 miles South of Roan Mountain, Tennessee. The Balds of the Roan Massif host many rare and endemic species recognized as rare on national and regional levels.

In February of 2022, there was a low-intensity surface fire that burned approximately 4.5 arces of land on the south-facing slope of Round Bald.

# Methods

## Study Site

Round Bald is located in the Roan Mountain Massif of the Unaka mountain range of the Southern Appalachian Mountains, at an elevation of 1,775 m and approximately 36°06’N and 82°60’W. The Appalachian Trail (AT) runs along the study site and acts as the center line for the plant community transects. Round Bald is located about 12.8 miles north of Bakersville, North Carolina in the Pisgah National Forest and 12.4 miles south of Roan Mountain, Tennessee in Cherokee National Forest. The first four transects established by Stokes and Horton (2022) were relocated and used in this study, as the fire did not extend to the subsequent transects. Here we are looking at differences in plant community composition and soil seed bank following low-intensity ground fire.

In this study we sampled the first four transects established by Stokes and Horton (2022) using the new AT as the central line. Individual plots were relocated from Gaia GPS data (n.d.) and then marked again to reflect current plot location. Distance north and south was measured from each plot to the AT. Plots were laid out as perpendicular to the new AT as previous waypoints indicated. Transects were separated by 150 meters, as established by Stokes and Horton (2022), and plots were 8-12 meters from each other. Historic plots described by (**HamelSommers.1990?**) were not sampled. Plant Community percent covers data were collected for the first growing season in June 2022 and the second season *in June 2023*.

In this instance we will measure the percent coverage and presence of vegetation using a 1-m x 0.5-m PVC quadrat divided into 50 equal sized squares. Plots will total 1 m^2, and sample the northern half followed by the southern half. Each square will be visually assigned by dominant vegetation type to equal 100% coverage per plot. Ground layer (<1m in height), shrub layer (>1m in height), and overstory (if present) vegetation will be determined and categorized accordingly per recommendation (**Stokes.2020?**) developed by USFS botanist Gary Kauffman. In total 226 plots along 12 transects were sampled in 2020, of these about 54 plots along the first four transects were in the 2022 fire and another 49 plots along the same transects were out of the fire. This will provide us with clear borders to examine plant community changes as a result of fire following two sampling seasons in June through August of 2022 and 2023.

To examine the effects of fire on the seed bank, soil samples will be collected at three plots along each transect for both burned and unburned areas. This will provide 12 soil seed bank samples for either treatment that will be further split into three depth categories following Price et al. (2010). Soil seed bank samples will be taken with a 5-cm diameter tube at a depth of 20-cm and carefully fractionated into depth categories of 0–5, 5–10 and 10–20 cm. Samples will then be placed in tins before being transferred to the greenhouse, air dried, and stored at room temperature until use.

Soil seed bank samples will be examined following the seedling emergence method, in which, 100g fractions of soil samples are mixed with sterilized potting mix to a 2-cm depth in 11- x 8.5- x 5-cm seedling trays. Six control trays will be prepared with sterile potting mix to check for contamination. Trays will then be placed in the greenhouse at ambient temperature. Watering will occur daily until soil is saturated. As seedlings emerge they will be identified, counted, and removed on a weekly basis. The species that cannot be identified will be repotted until identifiable (Price et al. 2010).

## Statistical Methods

Data sets were imported to the statistical program R studio for analysis (R Core Team 2021).

# Results

# Discussion

# Acknowledgements

# References

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