Fire on Round Bald

## Introduction

Upper montane treeless meadows - otherwise known as balds - command high floral diversity, panoramic views of the landscape, and origins shrouded in mystery (Murdock 1968, Gersmehl 1970). Most of these balds exist above 4,000 feet in elevation, however in ecological terms, true balds occur above 4,600 feet elevation. According to Murdock (1968), true balds only occur in the Southern Blue Ridge Physiographic Province. Two types of balds have been identified; heath balds - dominated by woody ericaceous species or grassy balds - dominated by herbaceous vegetation such as, grasses and sedges (Cain 1930, Murdock 1968). After extensive review of existing literature, Gersmehl (1970) concluded that balds were formed as cultural artifacts that were maintained mainly by grazing of livestock and some form of burning. For these biodiverse balds to persist the mystery of their origin and their management needed to become separate concepts or else they will have vanished by the end of the century, as posited by Lindsay (1976). Management ensued with the most beneficial practice employed differing among agencies; the U. S. Forest Service (USFS) has committed to maintaining all grassy balds through mowing, while the Great Smoky Mountains National Park and Shenandoah National Park maintain some but not all balds (Murdock 1968).

Round Bald is located about 16 miles North of Bakersville, North Carolina and 14 miles South of Roan Mountain, Tennessee next to Carver’s Gap. This bald crests at 5,800 feet in elevation and has slope of approximately 21-degrees from northern edge to southern edge. Since the 1980’s, the management practice responsible for slowing succession on USFS’ Appalachian balds has been mowing to promote the diversity of the native grasses and sedges. However, these balds have been facing habitat loss due to woody encroachment of blackberry, Rubus alleghaniensis, signaling succession to the surrounding spruce-fir stand (Stokes and Horton (2020); Murdock (1968); Lenze (2015)). Mowing has proven successful in improving the coverage of grasses and sedges but encroachment by blackberry is a continued threat that needs further study. In February of 2022 a low-intensity surface fire broke out on Round Bald and burned approximately 4 acres, with little visible effect on blackberry. Fire has been shown to be effective at combating woody encroachment, and a preferred method of management over mowing (Murdock 1968), but the effects on the rare and endemic species is not entirely known.

The intention of this study is to examine the changes in the plant community and soil seed bank caused by the fire. Differences in plant community and examining what germinates from the seed bank following two growth seasons would provide incite whether this type of fire could be beneficial or detrimental to biodiversity on Round Bald. The goal is to provide data following disturbance to improve bald management and maintain these scenic wonders.

## Methods

Round Bald is in the Roan Mountain Massif of the Unaka Range of the Southern Appalachian Mountains, between Carver’s gap and Engine gap. The Appalachian Trail (AT) bisects the study site into North of the trail and South of the trail. The site itself is spread across parts of Pisgah National Forest in North Carolina and Cherokee National Forest in Tennessee, at approximately 36° 06’N and 82° 60’W.

In this study we will be sampling transects reestablished by Stokes and Horton (2020), who used the historic AT as the central line until it converged with the new AT. Their transects were laid out perpendicular to the AT and a GPS point was logged where the two met and the distance from the Carver’s Gap trail head was measured and recorded. Transects were separated 150 meters from each other and extended from the northernmost edge of the bald to the southernmost with vegetation plots established every 8-12 meters. Vegetation plots that overlapped with plots from Hamel and Somers (1990), distances were adjusted to resample those plots.

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 m2, 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 and Horton (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).

## References

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