AMARIS JALIL, SIERRA HOFFMAN, and MARK LESSER. Dept. of Biology, Shepherd University, Shepherdstown, WV, 25443. Predicting temperature at scales relevant for tree growth along elevational gradients in the central Appalachians.

It is well established that tree species grow within a realized niche. However, within that niche tree performance may not be equal. Therefore, we sought to quantify growth differentiation along elevational and climatic gradients in central Appalachia. A major issue of modelling tree growth is that regional weather stations are unable to capture fine-scale variation in temperature patterns along ecological gradients. To account for this variation, a linear regression model of temperature as a function of elevation was developed using daily temperature and precipitation data obtained from the National Oceanic and Atmospheric Administration for nine different weather stations in and around Shenandoah National Park, from which fine-scale temperature patterns of specific stations could be plotted and predicted.

The elevational range of our study spanned 294-1022 meters, with an average lapse rate of -0.007 °C/m for maximum temperature, and -0.005 °C/m for minimum temperature. Models of red oak ring width against climate and topographic variables found that predominantly spring and autumn maximum and minimum temperature, and precipitation from both the current and previous year, most strongly influenced growth performance. It was also discovered that while spring maximum temperatures have been increasing at higher elevations, they remain relatively stable at lower elevations. Conversely, spring minimum temperatures are increasing at lower elevations and not at high elevations, indicating that the temperature envelope is expanding at high elevations and constricting at lower elevations. This may have significant implications for how tree species will respond to changing climate differentially along ecological gradients.