VLSA helps measure effect of fire on Eastern red-cedar

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Eastern red-cedar (Juniperus virginiana L.) is a coniferous evergreen tree species that is native to the southeastern United States. However, over the last several decades, this tree has invaded ecological sites where it didn’t previously occur, primarily due to fire suppression. The species is not adapted to fire and will not survive in sites where fire frequently occurs. Many cycles of prescribed fire are often required to significantly reduce cover and density of Eastern red-cedar infestations, especially when the trees are taller than 4 feet and fine fuel is limited.

The Noble Foundation is conducting a study on the Oswalt Road Ranch (Love County, Okla.), measuring the effect of repeated burning on Eastern red-cedar cover and density. A challenge in this study is accurately measuring red-cedar cover over a large area. To address this challenge, we are collecting very large-scale aerial photographs (VLSA images) and studying them with image analysis and statistical software. One image has a field of view of 210 feet by 140 feet and has sufficient detail to distinguish Eastern red-cedar from other tree species.

The image shown in Figure 1 is an example of a VLSA image that shows several Eastern red-cedar trees. We measure two variables, cover and density, in each image by delineating each red-cedar tree (the blue polygons in the image). Red-cedar cover is the percentage of all image pixels that are within the red-cedar polygons. Density is the number of trees on a per-acre basis. To determine density, a few
us to capture nearly 1,500 images, with coverage of nearly 1,000 acres, every year. With these data, we will be able to accurately determine changes in red-cedar canopy cover, density and size class distribution. At the conclusion of this 10-year study, we will have detailed information available to help managers of red-cedar-infested rangeland make better decisions.

several months after fire that overlaps the area shown in Figure 1. The blue lines shown in Figure 2 are the same as those shown in Figure 1. Several things can be observed by comparing the images: several red-cedar trees were completely killed by the fire and each red-cedar suffered some degree of canopy reduction from the fire.

The VLSA imaging system allows calculations are required. For example, the image in Figure 1 is 5,010 pixels by 3,336 pixels, and the ground sample distance (the size of each pixel measured on the ground) is 0.54 inches, so the image is 225 feet wide and 150 feet tall, or 0.777 acres in area. There are 12 trees identified, so the density estimate is 15 trees per acre. Figure 2 shows the portion of the VLSA image taken

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