WORKING WITH LIDAR DATA IN FUSION: MONITORING BLACK BEAR BARK STRIPPING IN REDWOODS AT SCHATZ DEMONSTRATION TREE FARM

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Black bear bark stripping in redwoods is a threat to commercial timber production because of the detrimental effects on redwood tree health. The purpose of the study was to delineate vegetation characteristics of redwood plots at the black bear bark stripping sites at Schatz Demonstration Tree farm. FUSION, an open-source, spatially explicit, remote sensing software developed by the Silviculture and Forest Models Team of the US Forest Service was used to calculate a few forest-stand metrics. The main research question being asked is whether Lidar (Light Detecting and Ranging) derived forest metrics combined with LDV are useful to detect and isolate the bark-damaged redwood trees among healthy trees. FUSION allows visualization of Lidar data in the Lidar Data Viewer (LDV), and batch processing allows calculation of both individual tree and grid-based metrics within plots. Field visits were made to identify patterns and possible causes of bear bark stripping on redwood trees, and GPS points were collected from damaged trees. To work with FUSION, a bare earth model was created using a digital elevation model to display a contour map over an Orthophoto. Three plots with dead redwood, stripped and recovering redwood, as well as stripped and resprouting redwood were displayed using a small stroked-circle sampling method. Histograms were visualized in the LDV to distinguish high-intensity values for natural features such as vegetation and low-intensity values for features like wet and bare soil. Simple measurements of bare earth elevation and treetop height within plots were taken using Lidar point cloud data and visualized in the LDV window. Batch processing was performed to extract point cloud data within each plot using the Clipdata algorithm and then plot statistics were computed using the Cloudmetrics algorithm. Lastly, the Gridmetrics algorithm was used to generate a landscape-wide canopy cover raster. The results showed that the dead secondary-growth redwood plot has 73 % canopy cover, while the stripped and recovering, plus the stripped and resprouting plots have 95% and 78% canopy cover respectively. The dead secondary-growth redwood plot has the tallest trees (60 m ±7.6) compared to the stripped and recovering (48 m ±8.4) and stripped and resprouting (41 m ±7.7) plots. In conclusion, calculating Cloudmetrics for each bear damage site, silviculturally managed sites, and undamaged sites would be valuable to understanding the structural characteristics of vegetation and their effects on black bear bark stripping-induced stress on redwood trees. Plot data and site

characteristics are vital to integrate with Lidar data matrices for insight the impact of black bear bark striping on conifer forests.

Keywords*: Bark stripping, Redwoods, LiDAR, Fusion, Forest metrics*