Evaluating Forest Volume Estimation at Barksdale Air Force Base Using Lidar and Multispectral Imagery

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ABSTRACT

Hardwood and pine stand volume estimates compiled from past field plot samples were compared to Lidar volume estimates through the interpretation of Lidar assessed height, crown width and trees per acre to ascertain if Lidar derived volume estimates can be used in lieu of traditional volume measurements.

KEYWORDS

Volume, Lidar, field plot, crown width
Initially, a map representing all hardwood and pine forest stands at Barksdale Air Force Base, Louisiana were extracted from a map encompassing the entire base. Once extracted, sample points for all pine stands were determined to mimic the sampling density of already existing sampling points for hardwood forest volume estimates on the base (Figure 1). Once determined, field crews visited each pine stand sample point to assess pine volume estimates per acre using 1/10th acre sample plots identified within the pine forest area using traditional field measurements of species, DBH, total height and crown width.

Figure 1. Hardwood and pine forest stand sampling points stratified within Barksdale Air Force Base.
In conjunction with field plot estimates, Lidar data of the base were acquired and manipulated to create a digital surface model and digital elevation model of the forested areas of the base. A canopy height model was then created with forest stand parameters of height and crown width extracted from both the hardwood and pine sample points for comparison with field collected volume estimates (Figure 2).

![Lidar Grid](image)

Figure 2. Example of a canopy height model for forest stand 17 and sample points 17A & 17B.

Lidar derived forest parameters were compared with field volume estimates for both the hardwood and pine forest stands to ascertain if Lidar derived forest parameters of height and crown width are highly correlated with field estimates of volume (Figure 3). Initial results indicate that measured field volume was slightly correlated with Lidar derived height while measured field volume was not correlated with Lidar derived crown width.
Figure 3. Correlation between field estimates of volume and Lidar derived average stand height.