

Browning, DM, Archer, SR, Byrne, AT. 2009. Field validation of 1930s aerial photography: What are we missing? **Journal of Arid Environments**, In Press.

Abstract:

Aerial photography from the 1930s serves as the earliest synoptic depiction of vegetation cover. We generated a spatially explicit database of shrub (*Prosopis velutina*) stand structure within two 1.8 ha field plots established in 1932 to address two questions: (1) What are the detection limits of panchromatic 1936 aerial photography?, and (2) How do these influence *P. velutina* biomass estimates? Shrub polygons were manually digitized on 1936 imagery and linked to 1932 field measurements of *P. velutina* canopy area. Aboveground 1932 *P. velutina* biomass was estimated using a site-specific allometric relationship for field-measured canopy area. Shrub canopy detection limits on the 1936 imagery were comparable to those reported for contemporary imagery. Based on a conservative shrub size detection threshold of 3.8 m², 5.8% of *P. velutina* biomass was missed. Spatial resolution (0.6 vs. 1.0 m) did not influence detection limits, but the overall accuracy of shrub cover estimates was greater on 1.0 m images. Presence of the sub-shrub *Isocoma tenuisecta* may also have significantly influenced estimates of *P. velutina* canopy area. These analyses illustrate the importance of standardizing aerial photo interpretation protocols, accounting for uncertainty estimating shrub biomass, and caution species-specific interpretations for historic aerial photography.