Using sUAS to estimate grassland biomass:

Implications for habitat monitoring, grazing management, and fuel load estimates

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INTRO

- Biomass estimates are needed to manage natural resources.
- Traditional clip-and-weigh techniques are slow, costly, and labor intensive.
- Dormant season biomass cannot be estimated using current remote-sensing techniques such as NDVI.

METHODS

- North American tallgrass prairie sites were simultaneously sampled with drone and clip-and-weigh methods.
- A linear regression model was developed using drone imagery and AgiSoft analysis.
- The model was validated at 2 sites.

RESULTS

- Vegetation dry mass = 2268.3 (vegetation height) - 49.214, R^2=0.7491
- Biomass estimated using the drone technique was significantly correlated with clipped biomass on validation sites.

DISCUSSION

- Drones can be used to estimate biomass relatively quickly using off-the-shelf components.
- Presence of brush or trees may require modification of sampling techniques and model development.

Drones can be used to measure both dormant and growing season rangeland biomass.

Biomass estimates using this technique are useful for managing grazing, wildlife habitat, and fuel loads.
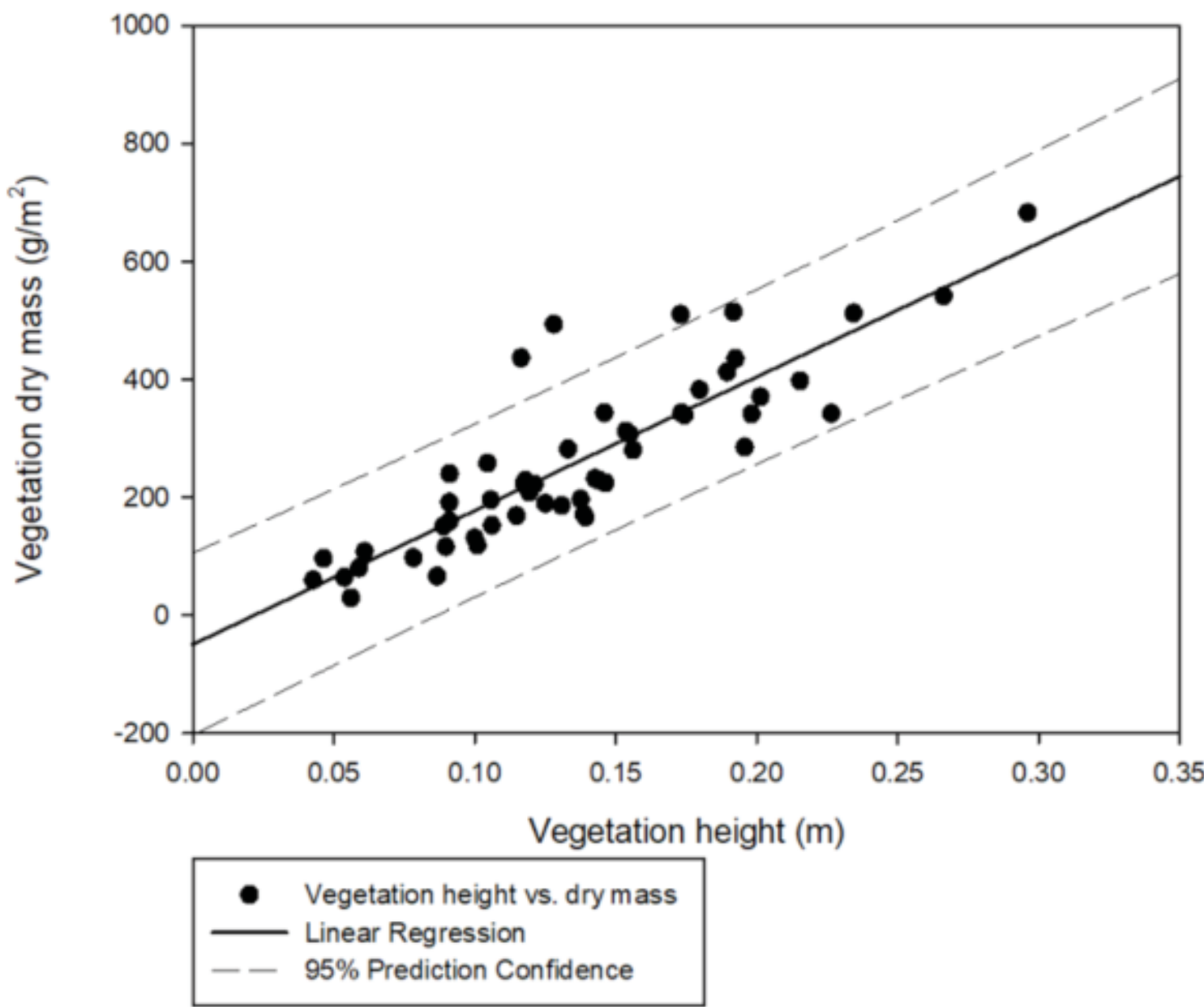

Figure 2: Linear regression plot relating dormant season vegetation canopy height to vegetation dry biomass in grasslands of the Flint Hills region of the United States. Vegetation canopy height was derived from a digital surface model produced with aerial images generated with a small unmanned aircraft system.
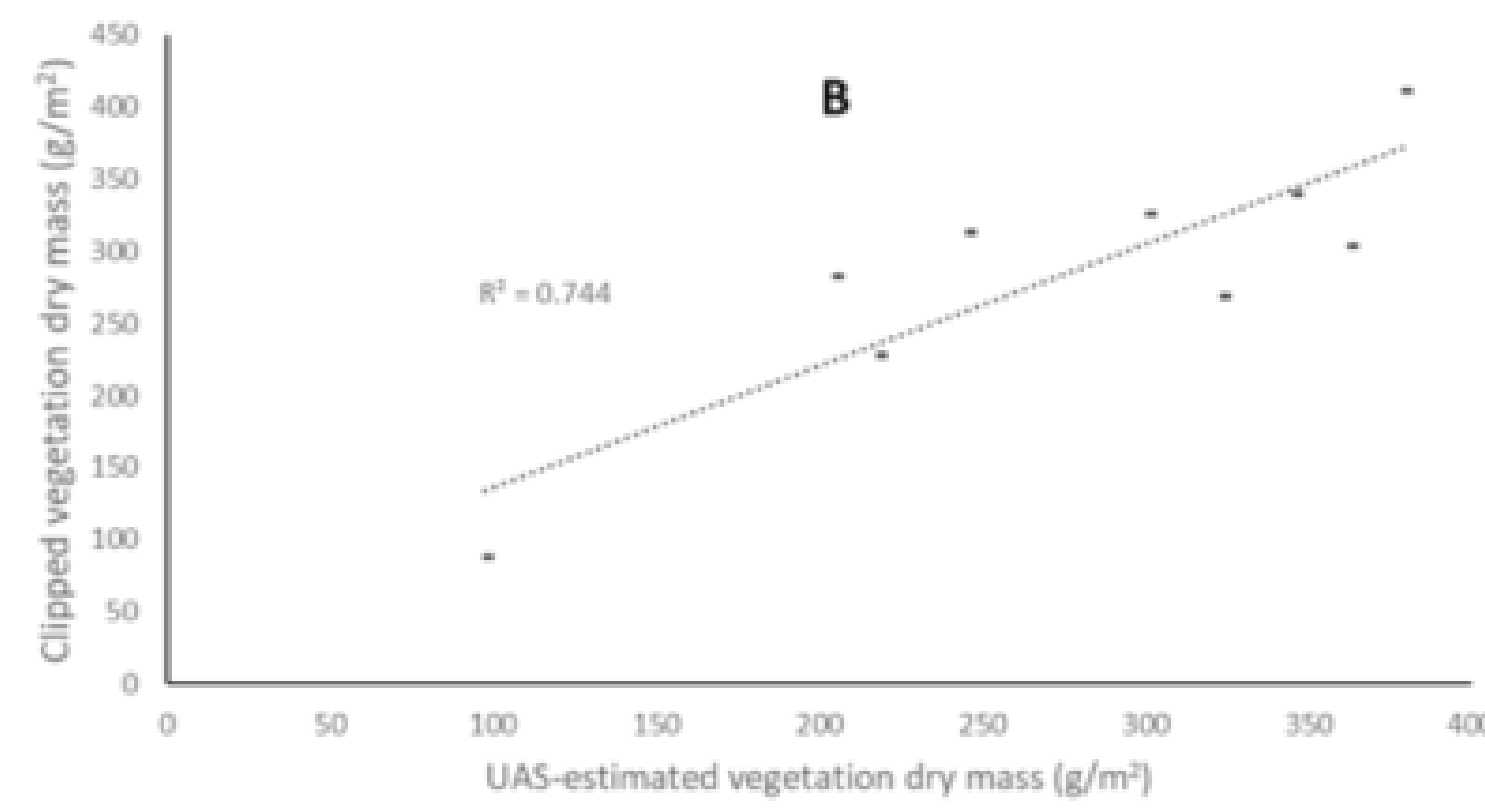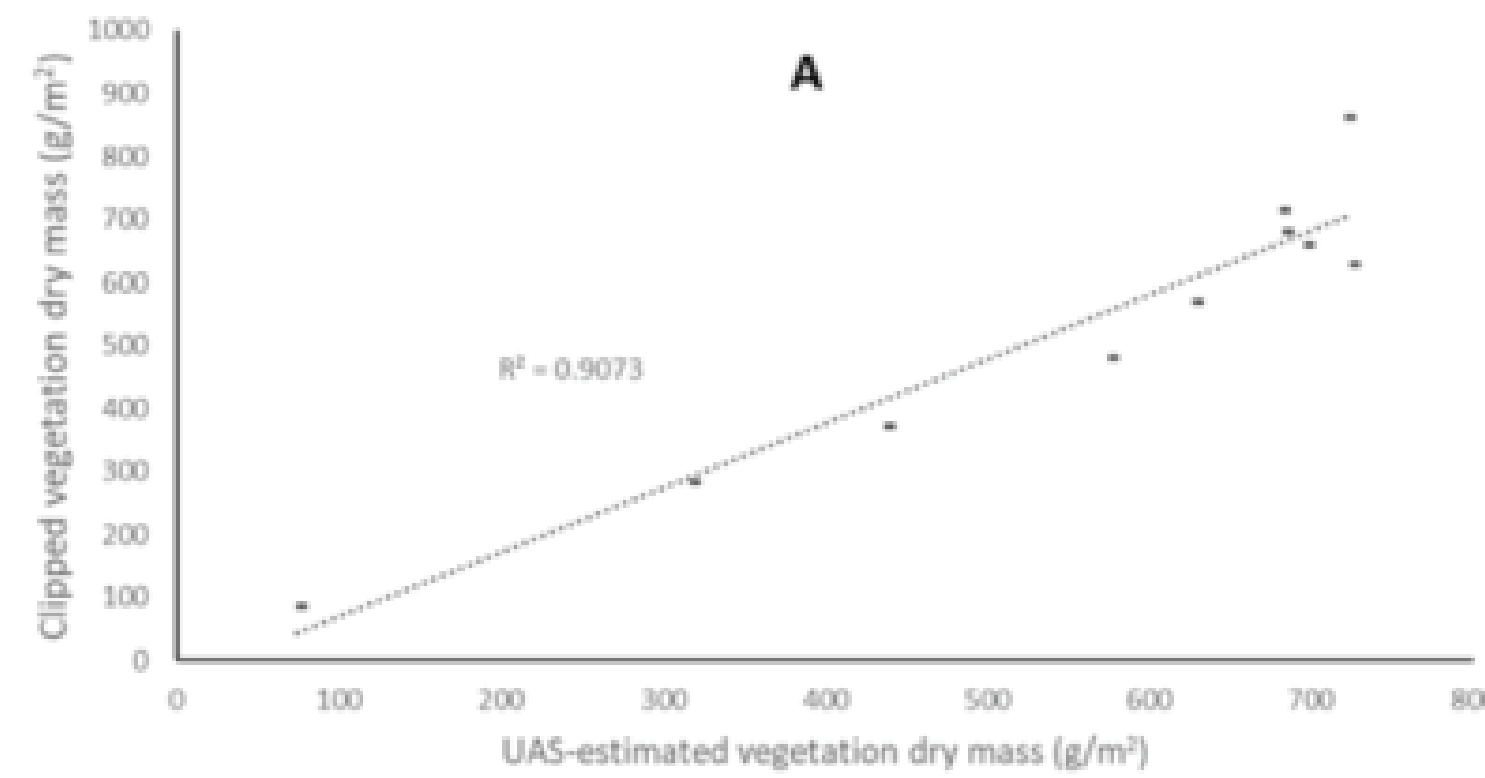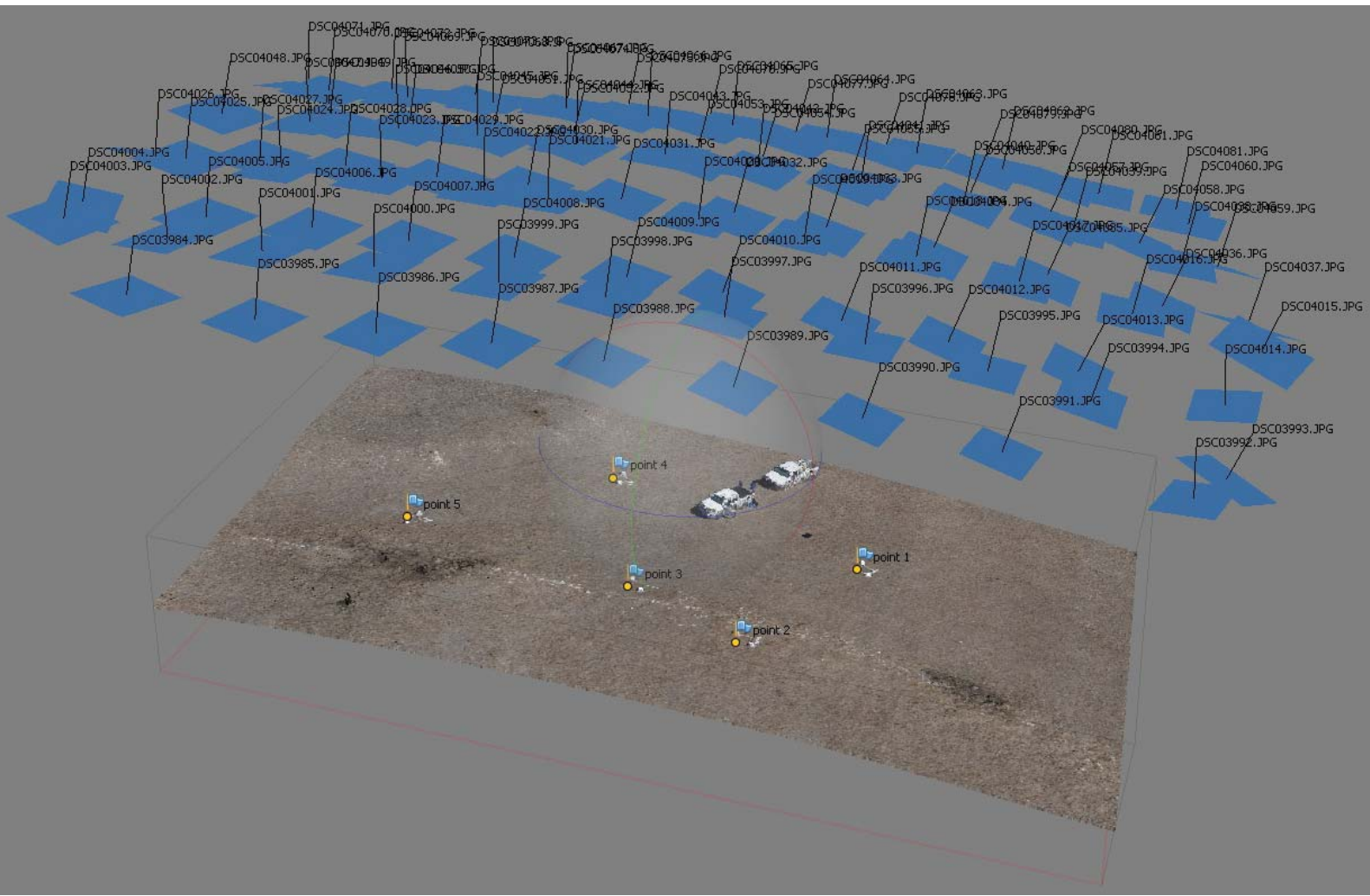

Figure 3: Linear regression plot relating dormant season vegetation dry mass estimated from clipped vegetation to dry mass estimated using vegetation height derived from digital surface models produced from aerial images generated with a small unmanned aircraft system in grasslands of the Flint Hills region of the United States, specifically in Chase County (A) and Riley County (B), Kansas.