

## Conifer Seedling Mapping using Drone Data CRES



Nayani Ilangakoon, Tyler McIntosh, Jennifer Balch, CIRES/Earth lab, University of Colorado, Boulder



## \*Background:

- Post-disturbance regeneration in coniferous forests requires spatial distribution of seedlings.
- We evaluated the capability of high resolution low cost drone images to locate and assess the structure of conifer seedlings in the post burned scars.

Wildfires in the western US (1900-2017) Legend Fire frequency EPA III ecoregions

Figure 1: Wildfires in the west during 1900-2017 with frequency of reburns across EPA level III ecoregions.



Figure 2: Snapshot from Hayman fire (2002) landscape taken in 2022



Figure 3: Phantom 4 pro drone image collection from burned sites

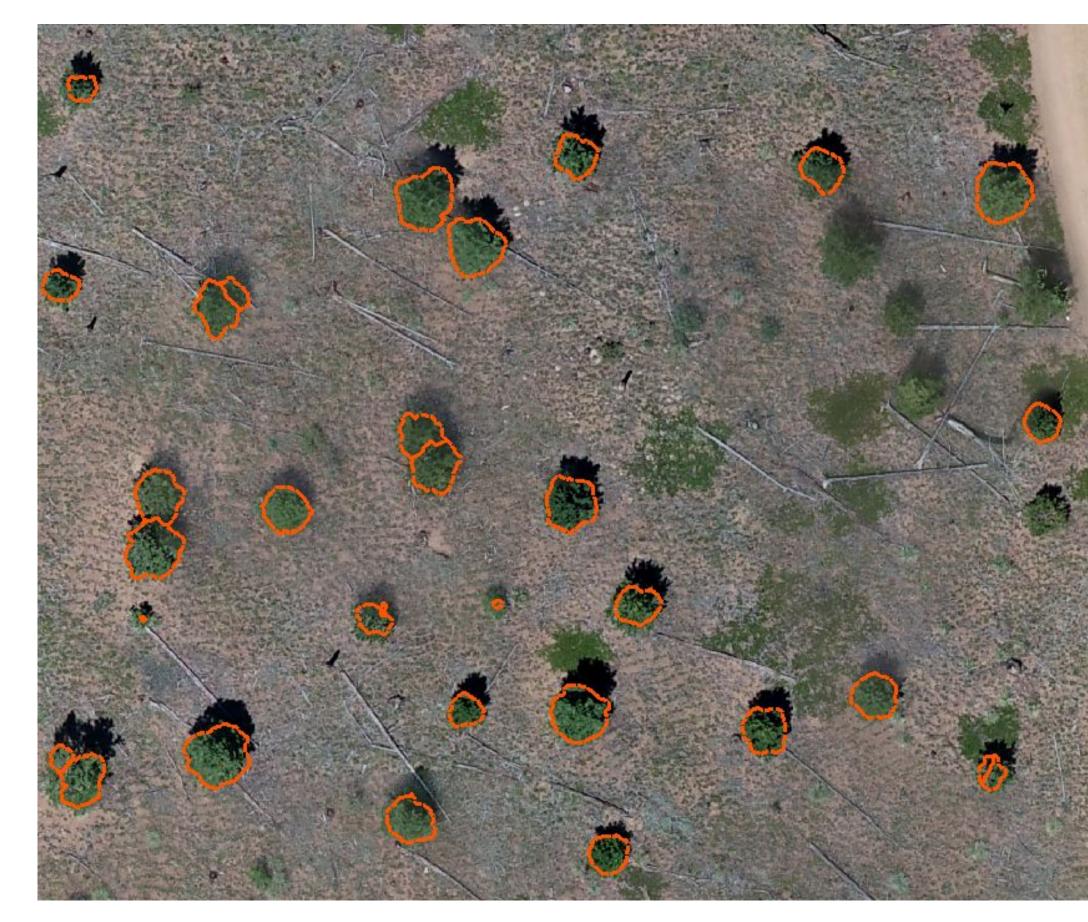


Figure 5: Delineation of individual seedlings

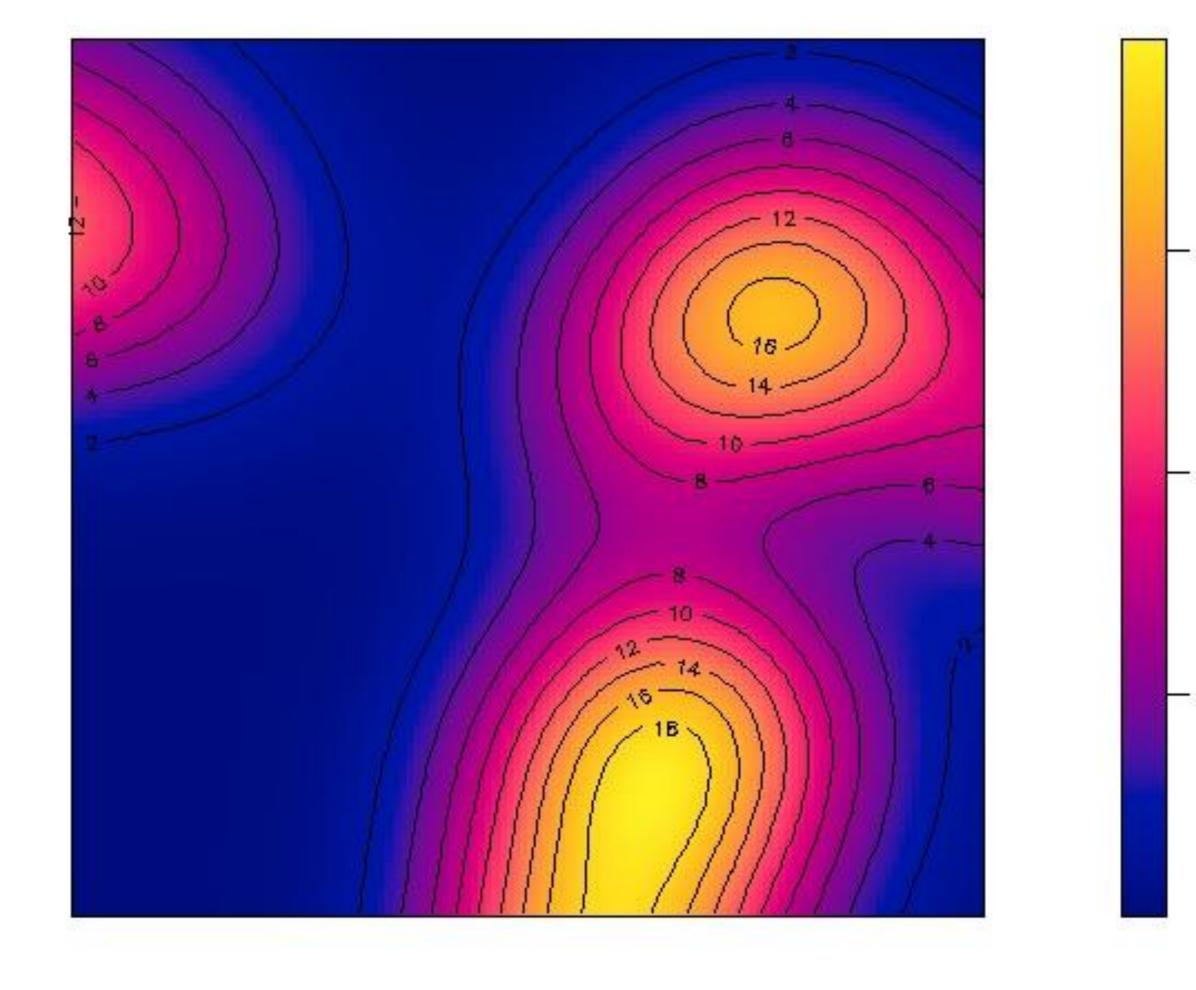


Figure 6: Spatial density of seedling distribution

## Point cloud Orthomosaic Texture **RGB** indices Point cloud Canopy height based variables model Canopy height model based variables In-situ seedling Training Extract image (Texture, Potential seedling indices) and 3D (point cloud polygons polygons polygons and CHM) based variables per potential seedling polygon Classification Testing Model performance Best model polygons

motion

Figure 4: Methods to drive postfire recovery seedling presence and structural metrics from high-resolution drone data.

## Results and Conclusions

High resolution drone images can isolate individual conifer seedlings as small as 0.5 m diameter from similar sized shrubs as well as from other vegetation (grass, trees) and non vegetation (ground, rocks, and dead trees) classes allowing us to;

- Prioritize sites for management intervention
- Model postfire recovery and ecosystem transformations
- Evaluate microsite impacts on regeneration