

Monitoring fine-scale spatial patterns of restoration treatments in the Uncompahgre Plateau

Jeffery B. Cannon*, Marin E. Chambers, Antony S. Cheng

*Jeffery.Cannon@colostate.edu; Dept. of Forest and Rangeland Stewardship, Colorado State University

Background

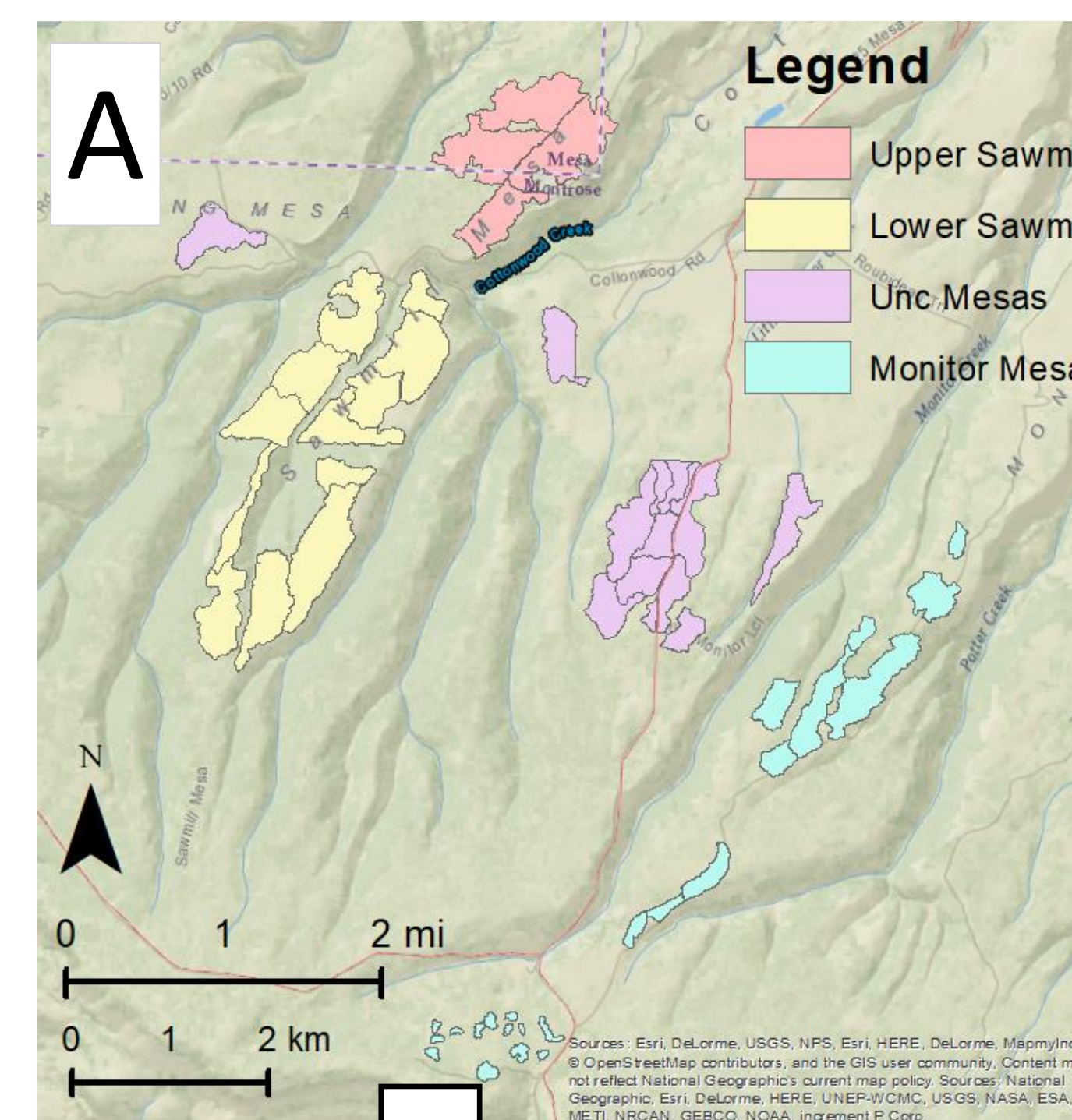
- Large, severe wildfires impact many dry forests of the western U.S prompting forest managers and stakeholders to take action.
- The Uncompahgre Partnership (UP) seeks to reduce fire risk and increase forest resilience to wildfire through the Collaborative Forest Landscape Restoration Program (CFLRP).
- Mechanical thinning treatments of the UP CFLRP in ponderosa pine dominated forests focus on restoring historical elements of spatial patterns:**
 - Creating open conditions
 - Creating 'mini-meadows'
 - Increasing spatial heterogeneity
- Complex and variable spatial patterns drive many processes including**
 - Environmental conditions
 - Biodiversity
 - Forest growth and dynamics
 - Wildlife habitat availability
 - Fire behavior

Monitoring questions

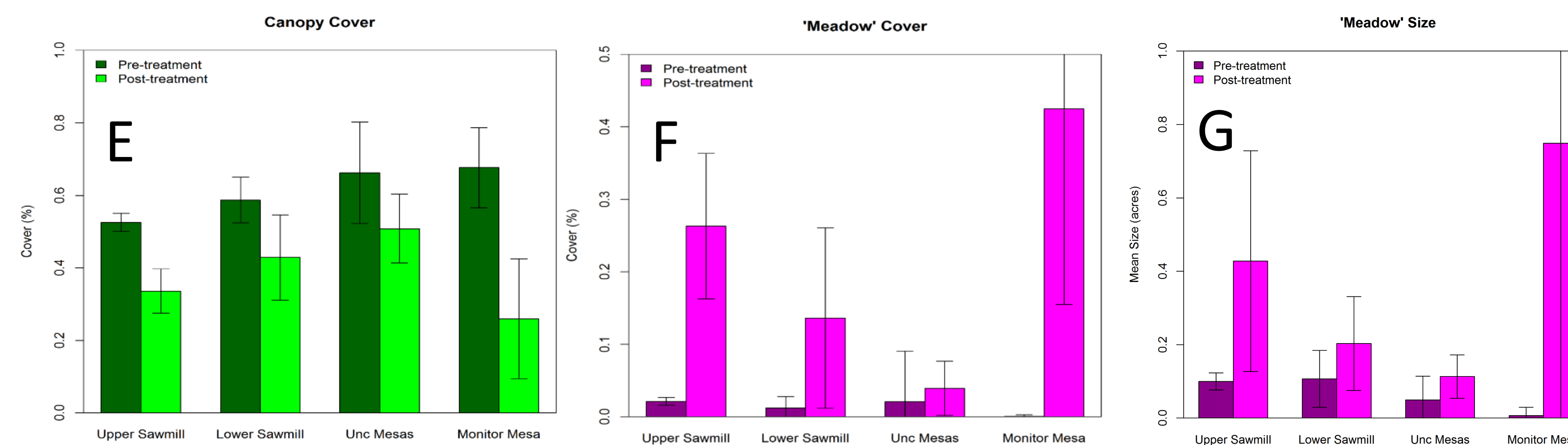
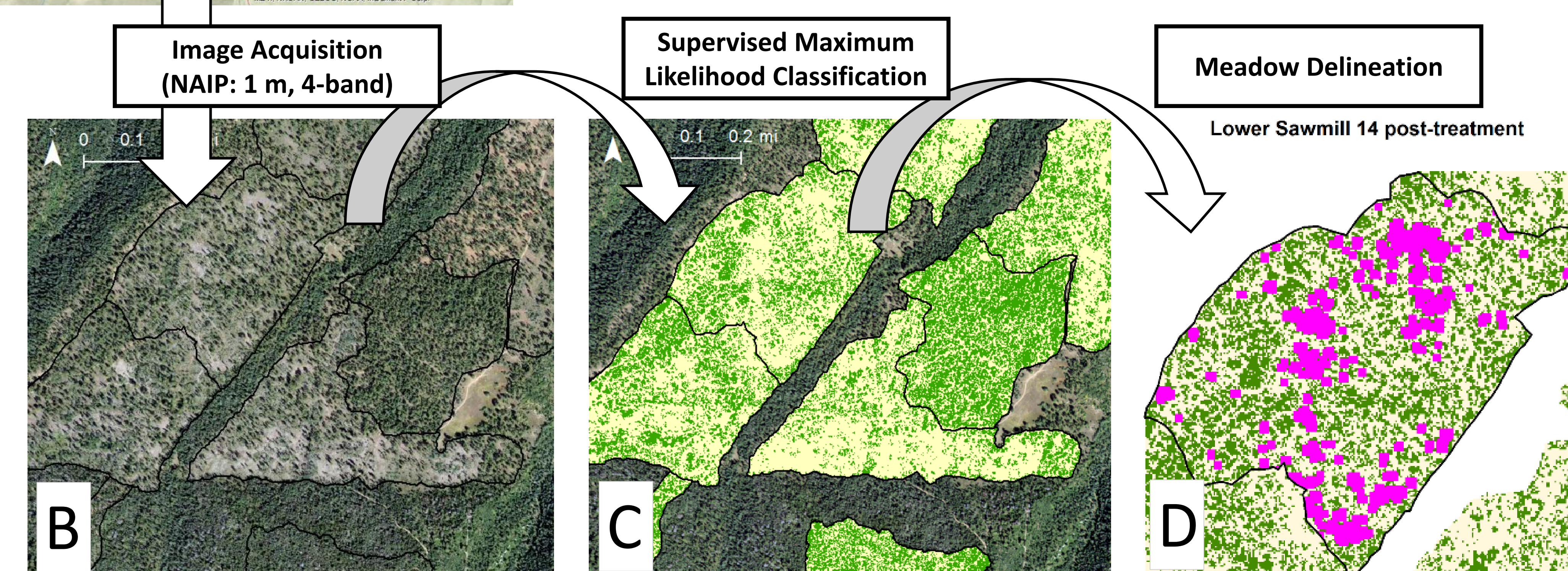
Given the large past and future investment in this and similar restoration programs, we examined:

- Are treatments meeting desired goals related to creation and maintenance of complex spatial patterns?
- How do restoration outcomes relate to historical conditions as described in previous studies?

Methods and Results



- We examined four UP mechanical thinning treatments including (1) Unc Mesas, (2) Upper Sawmill, (3) Lower Sawmill, and (4) Monitor Mesa units.
- We acquired aerial imagery from the National Agricultural Imagery Program (NAIP).
- We used supervised maximum likelihood classification to classify imagery as canopy (green) and openings (yellow).
- We delineated 'mini meadows' as openings larger than 24 m (80 ft) in diameter (magenta).



- Canopy cover was reduced** in treated areas from 62 to 41%
- Meadow cover** increased from 1.5% to 16% but was highly variable among and within treatments
- Meadow size increased** from 0.03 ha (0.08 ac) to 0.1 ha (0.25 ac)
 - Meadow density increased from 1 per 4 ha to 5 per 4 ha (from 1 per 10 ac to 5 per 10 ac).
 - Spatial outcomes were variable among treatments with the most gap creation in Monitor Mesa, and the least gap creation in Unc Mesas treatment.

Discussion

- UP treatments are moving forests toward collaboratively-defined desired conditions by creating more open, complex landscapes.**
- Historical conditions can provide further context to landscape changes.
- Matonis and others (2014) reconstructed historical (1875) forests and found meadow coverage may be as high as 65%.
- Extensive meadows may have been the result of widespread moderate-to high-severity fires (Baker 2017).
- Continuous deliberation on desired conditions in the face of scientific understanding is an important part of an adaptive management (AM) approach.
- Additional monitoring is warranted to understand the ecological function of meadows over time.

Next steps

- Collaborative adaptive management may lead to changing restoration outcomes of treatments over the 10-year CFLRP.**
- Examination of these trends may highlight the effectiveness of collaborative approaches to large-scale restoration initiatives.

References

- Matonis MS, Binkley D, Tuten M, Cheng T (2010) The Forests They Are A-Changin': Ponderosa pine and mixed conifer forests on the Uncompahgre Plateau in 1875 and 2010-13. Colorado Forest Restoration Institute. CFRI Technical report.
- Baker, WL (2017) The landscapes they are a-changin'—Severe 19th-century fires, spatial complexity, and natural recovery in historical landscapes on the Uncompahgre Plateau. Colorado Forest Restoration Institute. CFRI-1704.