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## ❖ Background:

- ❖ Postfire forest recovery can take different pathways depending on the rates of vegetation mortality, recruitment and regrowth.
- ❖ We evaluate;
  1. How does the recovery rate vary across three ecoregions (Pacific North west, Northern Rockies, and Southern Rockies)?
  2. To what extent do climatic conditions and fire characteristics explain postfire recovery in each ecoregion?
  3. To what extent did wildfires in the western US change growing stock volume (GSV) over a 34-year record?

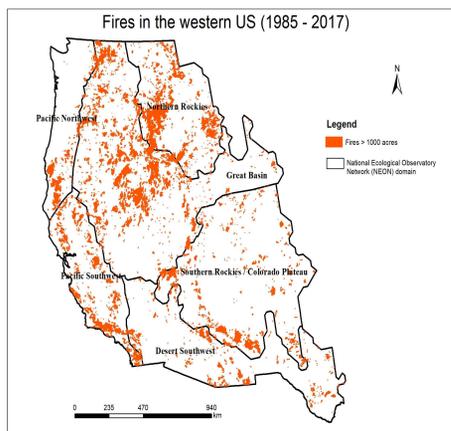


Figure1: Fires that burned more than 1000 acres across the western US between 1985- 2017. Black lines are ecoregion boundaries of the National Ecological Observatory Network.

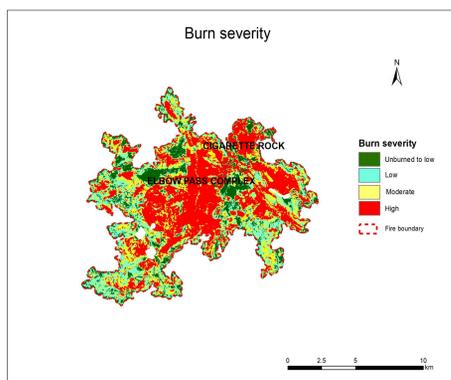


Figure2: Mixed burn severity pattern within fires. The burn severity categories are based on Monitoring Trends in Burn Severity (MTBS) program.

## ❖ Methods:

- ❖ Extracted Global Ecosystems Dynamic Investigation (GEDI) estimated vegetation height and cover metrics from all burn severity categories and from unburned background forests from each fire.
- ❖ Calculated percent change of canopy height.
- ❖ Calculated growing stock volume (GSV) using canopy height and cover estimates.
- ❖ Fitted non-linear models to build postfire recovery trajectory for three chronosequence, PNW, NR, and SR using percent canopy height change and the time since fire.

- ❖ Applied Generalized Additive Models (GAMs) to explore the effects of fire size, topography, climate, and fire severity on postfire vegetation recovery.

## ❖ Results:

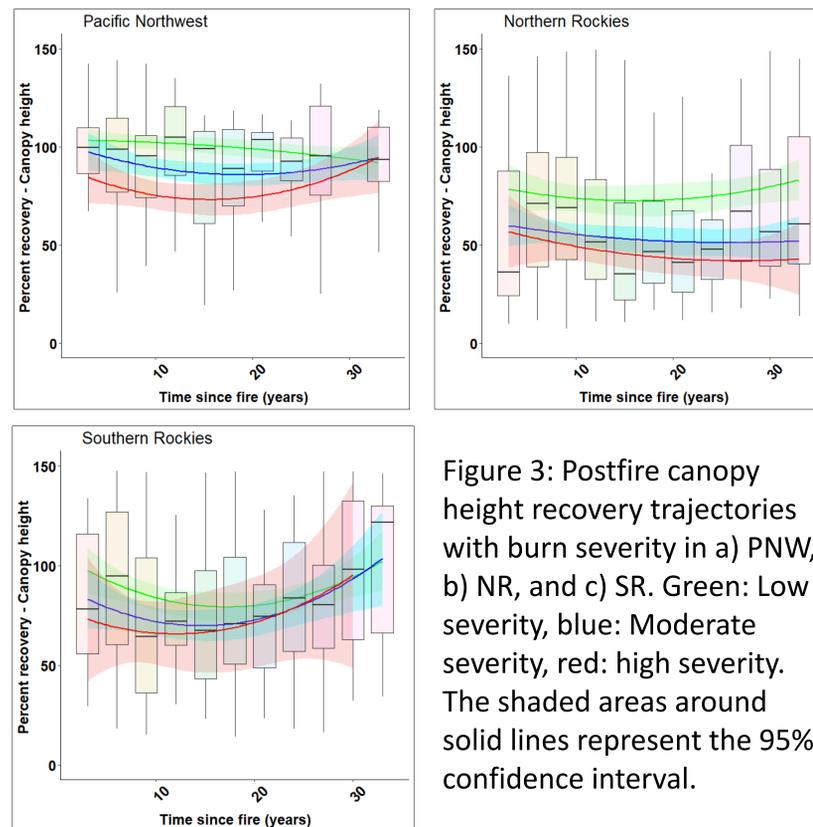


Figure 3: Postfire canopy height recovery trajectories with burn severity in a) PNW, b) NR, and c) SR. Green: Low severity, blue: Moderate severity, red: high severity. The shaded areas around solid lines represent the 95% confidence interval.

- ❖ Western US ecoregions take between 9-25 years to show a gain of canopy height beyond tree mortality.
- ❖ High burn severity regions show the largest decline in canopy height (23 % - 52.5%), while low burn severity areas show the lowest (1.3% - 6.2%).
- ❖ Southern Rockies gains 14% of growing stock volume (GSV) while both the Northern Rockies (-32%) and Pacific Northwest (-7%) show a loss of canopy volume .

## ❖ Conclusions

**If the fire return interval becomes shorter than 50 years, the rapid recovering forests in Southern Rockies potentially store more carbon than the pre-fire state while both Northern Rockies and Pacific Northwest regions will significantly reduce the carbon stock .**

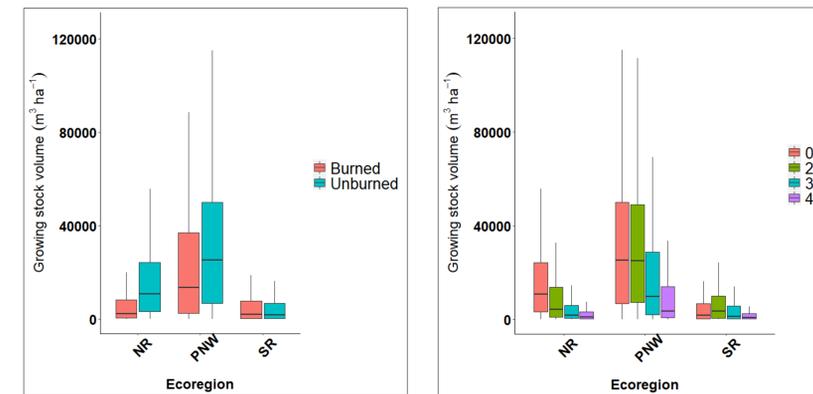


Figure 4: Per pixel canopy volume across three ecoregions using 34 years of fire records a) Overall canopy volume regardless of fire year and severity. b) Canopy volume across burn severity gradient. 0 to 4 represents burn severities of 0 - Unburned, 2 - Low Burn Severity, 3 - Moderate Burn Severity, 4 - High Burn Severity

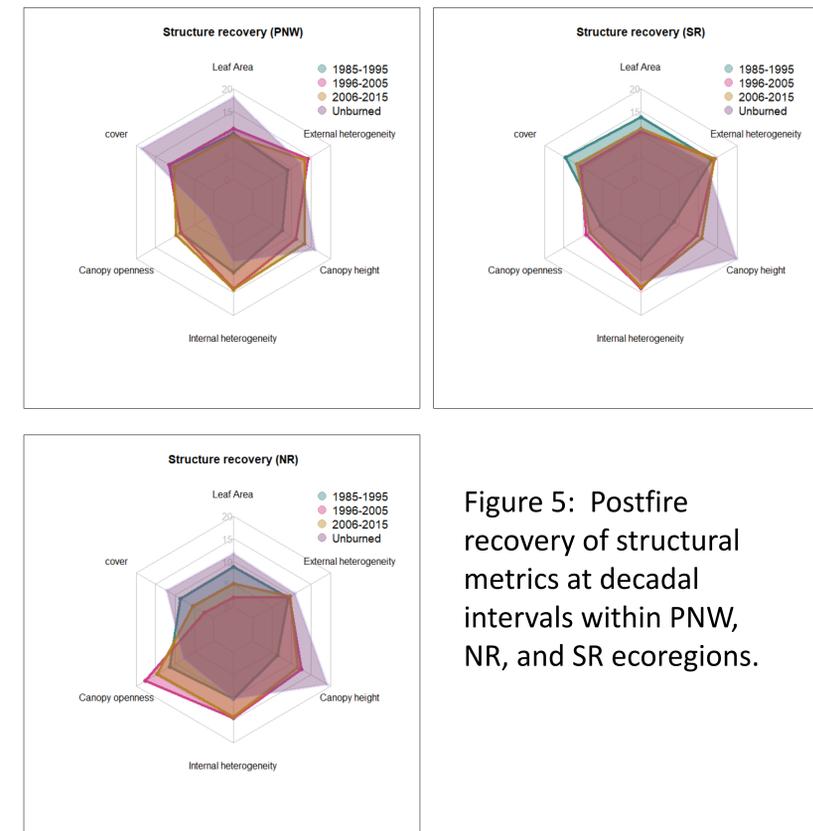


Figure 5: Postfire recovery of structural metrics at decadal intervals within PNW, NR, and SR ecoregions.

- ❖ Canopy openness and internal canopy heterogeneity exceeds the unburned state in all three ecoregions.
- ❖ Canopy external heterogeneity is the only metric that recovers to its unburned state