Testimony by

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September 4, 2015

I am going to briefly synthesize the best scientific understanding from peer-reviewed research on:

- 1. Forest restoration need in Colorado (low elevation)
- 2. Bark beetles in subalpine forests (high elevation)
- 3. Wildfire risk in the wildland-urban interface (WUI)

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- Smokey Bear: successful fire prevention program with unintended consequences.
- Past suppression of frequent, low-severity ground fires led to fuels build up.





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High elevation subalpine







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Veblen and Lorenz 1991

Less than 20% of Colorado's forests historically were open woodlands of ponderosa pine, that experienced frequent, low-severity ground fires. Low elevation.



About half of Colorado's forests are naturally dense. Fires burn infrequently, but are big, hot and out of control, historically and today. High elevation.



High-severity fire is characteristic of the majority of Colorado forests



Forest restoration: Challenges

- Most of the WUI is ponderosa pine.
- In this zone, thinning and Rx fire treatments would restore forests and help protect communities from severe wildfire –it's a win-win.
- However, most of the WUI is private, so creative solutions are needed to manage fuels and fire risk in these populated forests.
- Fuel treatments outside low-elevation ponderosa pine are fire mitigation treatments, not restoration.

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Boom-bust is the name of the game for subalpine forests. <u>Adapted</u> to high-severity wildfire and beetle attacks.

<u>Native</u> Bark Boring Beetles Subalpine forests

Mountain Pine Beetle Lodgepole pine and ponderosa pine Spruce Beetle Engelmann spruce

Native and always present in subalpine forests Prefer larger older trees Drought and warming allow populations to explode



Synchronous outbreaks of bark beetles in Alaska, British Columbia and Western US reflect broad-scale climate changes of increasing drought and warming.







MPB-affected forest and clear cuts, Cariboo-Chilcotin, BC

Lesson from British Columbia: Timber harvest can protect particular stands from infestation, <u>but will not stop outbreaks</u>.

Annual acres affected* by Bark Beetles in Colorado





High severity MPB-attack, ~50% of the trees are still alive. "Next forest" = all non-host trees, and younger lodgepole pine.





"Next forest" = non-host trees, younger host trees. More open, more diverse and younger. Intact understories. Heterogeneity. Post-BB forests are healthy, thriving.



MPB 1920s



60 yrs post-MPB



40-yrs post-SB



70-yrs post-SB

Pre-BB forest conditions return ~50-70 yr post-BB. BB-affected forests resistant to future outbreaks for the next ~70-100 yrs.



Salvage logging resets the "next forest" back to start, reduces habitat quality, nutrients/productivity, and heterogeneity.

Salvage and biomass projects may still be desirable options, but should <u>not</u> be based on a forest health need in subalpine forests.



Photo: Paul Mintier

Clearcuts and tree removal near communities, trails, campgrounds, infrastructure (power/telecommunication lines) is a significant task to reduce wildfire and tree-fall risk.

There is significant concern about increased risk of wildfire in bark beetle killed forests.



Bark beetles don't make stands more likely to burn, drought does.

- Field studies show no consistent change in fire severity (i.e. how many trees burn) due to BBs .
- Fire fighting in BB-affected stands *is* very challenging (high hazards, rate of spread, spotting). Fire behavior is different from fire severity.









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WUI is Largely Undeveloped (< 20% developed)

WUI is Moderately Developed (20-50% developed)

WUI is Extensively Developed (> 50% developed)

Little to No WUI (< 10 square miles of WUI)

- 85% of Colorado's population lives in the Front Range.
- Colorado has the second most developed WUI (20%) in the West.
- Hundreds of thousands of homes at risk from wildfire.

Top Ten CO Counties Ranked by Growth Potential in the Wildland Urban Interface



Sq. Miles of Undeveloped WUI

Headwaters Economics. 2013. As Wildland Urban Interface (WUI) Develops, Firefighting Costs Will Soar

3. Wildfire risk in the wildland-urban interface (WUI)

Highest % of population exposed to wildfire risk: Douglas, El Paso and Jefferson counties



Fig. 5. This figure shows a comparison of county-level population exposed (aPOP), as a percentage of the total project area's aPOP, broken down by federal (black) versus private (grey) ownership. In addition, the proportion of factors contributing to the results (county size [acres], ignition loadings [ignitions], propensity for fire spread [BP]) are shown and broken down by federal (darker colors) versus private (lighter colors) ownership as well.

3. Wildfire risk in the wildland-urban interface (WUI)





Challenges

- To increase public safety:
 - Firewise existing homes
 - Fire-smart planning (e.g. Summit County)
 - Fuels reduction in/near communities
 - Removal of BB treefall and fire hazard near trails, communities, infrastructure (power/telecomminicat).
- To restore forests:
 - Thinning and prescribed fire in low-elevation forests (often non-federal land, WUI).



Questions?













Appendix

Drought and Wildfire





Restoration: Colorado Front Range

Lower elevations (<7200ft): Frequent low to mixed severity fire = WUI, private Higher elevations: Infrequent high severity fire Sherriff et al. 2014 PLOS

Haas et al 2015 Risk Analysis



2. Bark beetles in subalpine forests (high elevation) Spruce Beetle 2014





http://foresthealth.fs.usda.gov/portal/Flex/FPC

- Fires don't burn often in subalpine forests (relatively cool/moist).
- When it gets hot and dry enough, fires will burn subalpine forests uncontrollably.
- Fires burns where and when drought occurs, and does not necessarily target beetle kill.

Haas et al 2015 Risk Analysis



Hart et al 2015 PNAS

Timber Volume: Rocky Mountain vs Pacific Northwest

Pacific Northwest - Region 6



Headwaters Economics , 2015. National Forest Timber Sales and Timber Cuts, FY 1980-2014