



Mean total ecosystem carbon for two simulated treatments (control (c), thin and burn (TB)) under three difference climate periods (2010-2019, 2050-2059, 2090-2099) with the same wild-fire parameterization over the 100-year simulation period. Shaded areas are the 95% confidence intervals.

## Treatment Efficacy Under Climate Change

Climate projections for the southwestern US show a warmer future, which will increase water stress and could lead to weather conditions more conducive to wildfire. These climatic conditions are likely to exacerbate the current fire hazard problem that is the result of fire exclusion. I ran simulations of Camp Navajo in northern Arizona, which is predominantly occupied by ponderosa pine forest, to determine the effects of thinning and prescribed burning treatments under projected climate.

I found that the thinning and burning treatments currently employed to reduce the risk of high-severity wildfire maintain their efficacy under future climate. The initial carbon reductions associated with thinning and repeated prescribed burning were compensated by the reduction in high-severity wildfire and the treated scenarios stored considerably more carbon than the untreated scenarios (see Figure). The treatment scenarios had lower cumulative emissions from wildfire and prescribed fire than the cumulative wildfire emissions in the no-treatment scenario over the 100-year simulation period.

The effects of treatment on moderating fire behavior also positively effected carbon flux. Over the simulation period 32.8-48.9% of the no-management landscape was either carbon neutral or a carbon source to the atmosphere. Greater than 90% of the thin and burn landscape was a moderate carbon sink.

## Management Implications

Thinning and prescribed burning treatments resulted in the landscape storing more carbon than the control under projected climate.

Cumulative emissions from both wildfire and prescribed fire in the thin and burn scenario were lower than cumulative wildfire emissions under the control.

In the absence of thinning and burning treatments, high-severity fire patches had an increase in Gambel oak, which made the control landscape conducive to subsequent fire spread.

## Publication:

Hurteau MD. 2017. Quantifying the carbon balance of forest restoration and wildfire under projected climate in the fire-prone southwestern US. PLoS ONE 12(1):e0169275.

Funded by: US Department of Defense, SERDP Program, Project RC-2119.



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