Data Set Citation

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Tubbesing C , Stephens S , Battles J , and York R.
Post-fire shrub and juvenile conifer data, Sierra Nevada, CA USA 2015-2017
Tubbesing.4.1

General Information

Title:	**Post-fire shrub and juvenile conifer data, Sierra Nevada, CA USA 2015-2017**
Identifier:	Tubbesing.4.1
Abstract:	Our objective was to better understand long-term tree recovery in large high-severity fire patches. We measured juvenile conifer growth in relation to shrub competition in five fire footprints ranging from 8 to 35 years old and > 400 ha in size. To test whether reductions in conifer growth may lead to increased mortality, we also evaluated how recent tree growth predicts mortality of similarly aged juvenile trees in nearby managed stands.
Keywords:	Sierra Nevada; Tree mortality; Pinus ponderosa; Abies lowiana; High-severity fire; Montane chaparral

Involved Parties

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Data Set Characteristics

Geographic Region:

Geographic Description:	Blodgett Forest Research Station
Bounding Coordinates:	West: -120.6 degrees East: -120.4794 degrees North: 38.9 degrees South: 38.9 degrees

Time Period:

Begin:	2015
End:	2017

Taxonomic Range:

Classification:	Rank Name: Genus Rank Value: Abies Classification: Rank Name: Species; Rank Value: lowiana
Classification:	Rank Name: Genus Rank Value: Arctostaphylos Classification: Rank Name: Species; Rank Value: patula; Common Name: White fir
Classification:	Rank Name: Genus Rank Value: Ceanothus Classification: Rank Name: Species

Rank Value:	cordulatus
Common Name:	Greenleaf manzanita

Classification:

Rank Name:	Genus
Rank Value:	Ceanothus
Classification:	Rank Name: Species Rank Value: integerrimus Common Name: Deerbrush

Classification:

Rank Name:	Genus
Rank Value:	Chamaebatia
Classification:	Rank Name: Species Rank Value: foliolosa

Classification:

Rank Name:	Genus
Rank Value:	Notholithocarpus
Classification:	Rank Name: Species Rank Value: densiflorus Common Name: Tanoak

Classification:

Rank Name:	Genus
Rank Value:	Pinus
Classification:	Rank Name: Species Rank Value: ponderosa Common Name: Ponderosa pine

Sampling, Processing and Quality Control Methods

Step by Step Procedures

Step 1:

Description:

Wildfire footprint sample locating

Our site selection objective was to identify post-fire shrub fields across a range of fire footprint ages in order to capture gradients of shrub maturity, cover, and height. Because shrub-free areas are rare in stand-replacing fire patches of the Sierra Nevada, we quantified juvenile conifer growth across a gradient of shrub competition rather than comparing high-shrub areas to shrub-free areas. To ensure that environmental conditions were similar across sites, we limited sites to fire footprints that met the following requirements: between the North and South forks of the American River; greater than 400 ha in size; 5-50 years old; within the Tahoe or Eldorado National Forests; not planted or herbicided following fire; and containing identifiable shrub fields surrounded by mixed conifer forest according to satellite imagery. We identified five fire footprints that met these criteria. At the time of first field measurements (2016) the fires ranged in age from 8 to 35 years.

We located shrub patches using Google satellite imagery. We visited all accessible shrub-dominated patches that were greater than 1 ha in size, approximated using Google satellite imagery analyzed in QGIS 2.18.13. Only those shrub patches that contained juvenile conifers farther than 20 m from patch edge were measured. At each shrub patch, field crews located white fir and ponderosa pine seedlings and saplings 10-300 cm in height located at least 20 m from live adult trees. Juvenile trees that appeared to have been affected by herbivory or physical disturbance were ignored.

Instrument(s): A laser range finder was used to measure distance from overstory trees. The iPhone app Avenza was used to mark tree locations. A meter stick was used to measure juvenile conifer height.

Step 2:

Description:

Measurements in wildfire footprints

Juvenile conifers were tagged, GPS pinned, and measured for height and diameter. We then measured annual vertical growth based on distances between bud scars for the 2015, 2016, and 2017 growing seasons. Shrub cover surrounding each juvenile conifer was measured for each shrub species using the line-intercept method along three-meter transects facing each of the four cardinal directions. We chose three meters for transect lengths because it represents the distance at which two-meter-tall shrubs (the approximate maximum shrub height in our study area) would block sunlight from reaching the base of the focal tree for all sunlight <33° from horizontal. Measurements were conducted in 2016 and 2017.

Instrument(s): Diameter was measured using an analog hand calipers. Shrub transects were measured using a reel tape.

Step 3:

Description:

Mortality study

We sampled from Blodgett Experimental Forest because it was impractical to sample a sufficiently large size of dead trees in the wildfire footprint shrub patches. The Blodgett units we sampled from were majority Site Classes III (a measure of site productivity, Skovsgaard and Vanclay 2008) with some area in Site Class IV, making them similar to our fire footprints, which had 63% of samples in Site Class III and 22% of samples in Site Class IV.

We surveyed live and dead juvenile tree densities across 275 plots making up 864 m2 of area and hundreds of trees, yet we found fewer than 30 dead trees of each species. To capture adequate sample sizes of dead trees, we combined this plot survey with targeted sampling of equal numbers live and dead trees for more detailed growth measurements. Thus, two types of data were gathered: 1) a survey of live and dead juvenile tree densities, and 2) growth rates of live and dead juvenile trees paired by species, proximity, and height.

For the survey of live and dead tree densities, we placed evenly spaced 1-m radius circular plots on a 20x30 m grid across two study units at Blodgett Forest. In each plot, we counted live and dead white fir and ponderosa pine in each plot that were < 200 cm tall.

To sample growth rates of paired live and dead juvenile trees, we walked along pre-determined parallel lines running east-west in the two study units, each separated by 20 m. As we walked, we searched for dead white fir and ponderosa pine juvenile trees < 200 cm in height as we walked. When we located a dead juvenile tree, we measured its height, diameter, and the past three years of growth by measuring distance between bud scars. We also photographed each tree and recorded details of its physical characteristics such as twig retention, bark status, and needle color to help estimate its year of death. We then located the nearest living conspecific tree whose height was within 10 cm of the height of the dead tree and performed the same measurements. We harvested the live and dead trees at soil level to perform dendrochronological measurements, which were used to help identify year of death.

Data Set Usage Rights