The Role of Pre and Postfire Fuel Loads as a Component of Wildfire Severity in Sudden Oak Death Infected Oak Woodlands

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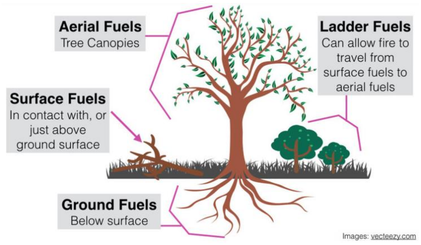
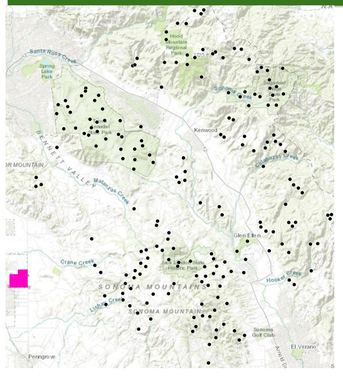
Introduction

- Fire fuels can be categorized by their vertical arrangement.
- **Surface fuels** provide *horizontal* continuity allowing fires to spread to different areas.
- **Ladder fuels** provide *vertical* continuity allowing fires to spread into the canopy.



- The 2017 Nuns Fire provided a unique opportunity to study how fire impacts local plant communities.
- Sudden Oak Death (SOD), caused by *Phytophthora ramorum*, has caused large scale mortality in Black Oak (*Quercus kelloggii*), Coast Live Oak (*Quercus agrifolia*) communities in Sonoma County.
- *P. ramorum* is spread by foliar hosts who do not die. The major foliar host in Sonoma County is Bay Laurel (*Umbellularia californica*).

Study area in east Sonoma County



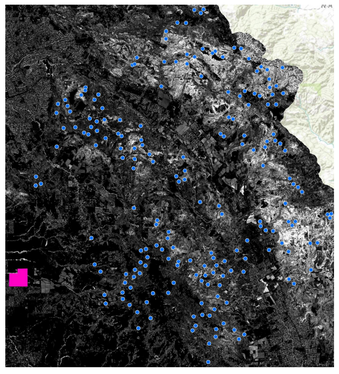
- Since 2003, 197 225 m^2 plots in oak woodlands have been used to study the effects of Sudden Oak Death (SOD) on three focal species: Black Oaks (*Quercus kelloggii*), Coast Live Oaks (*Quercus agrifolia*) and Bay Laurel (*Umbellularia californica*).
- During the 2017 Nuns Fire, 99 plots were within the fire perimeter.
- A subset of 100 plots (50 burned, 50 unburned) were selected for this study.

A plot at Bouverie Preserve. From left to right: 2009; November 2017 (shortly after the wildfire); April 2018.

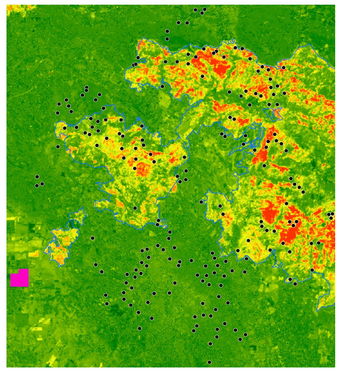
Research questions

1. How do fuel loads (ground and ladder fuels) impact fire severity in plots impacted by SOD?
2. How do fuel loads (ground and ladder fuels) change postfire in plots impacted by SOD?

Methods



2013 Prefire ladder fuels estimated using the number LiDAR returns between 1-4m. (Tukman Geospatial)



2017 Postfire relativized burn ratio (RBR) estimated using multispectral satellite imagery. (Dr. Matthew Clark, SSU)

- In 2014 Brown's Transects were performed in all 197 active long-term plots to measure fine and coarse surface fuels.
- Diameter at breast height (DBH) and stem status of all *Q. kelloggii*, *Q. agrifolia*, and *U. californica* were collected in 2016.
- In Fall 2018 and Spring 2019 plots were revisited and Brown's Transects were performed, and DBH of all dead focal species were measured.

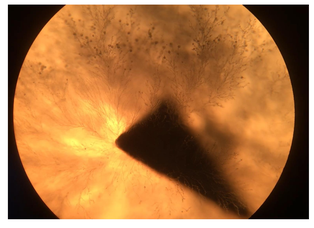
Using a 4m tall banner, we estimated postfire ladder fuels by analyzing photos taken of the banner for percent cover.

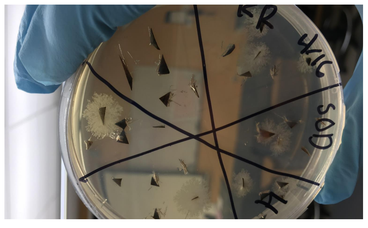
Discussion

- Research done in Big Sur on mixed Doug Fir Tanoak forests infected by SOD found that:
  - increased coarse surface fuels (long term infection) increased surface burn severity.
  - increased standing dead trees influenced (short term infection) increased high overall burn severity.
- Prefire Brown's transects in our plot network are being used to determine the effect of surface fuels on fire severity.
- Prefire ladder fuels are being quantified to determine the effect that ladder fuels have on fire severity.

Future Research

- This summer, we will continue gathering data from the remaining plots and analyzing the relationship between *P. ramorum* and fire severity.
- A protocol is in place for culturing and testing for *P. ramorum* in *U. californica* leaves.
- Current and future work will continue to explore these relationships and assist with management of oak-woodlands in light of increasing future fire risk.





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