





## Fire Suppression

With the increase in number and areal extent of wildfires in the western United States, it is imperative to respond to and contain a fire immediately. Fire control techniques include constructing fire lines and applying fire retardants. Post-fire, there is also often collateral ecosystem disturbance from fire management equipment, such as bulldozers used to install fire lines. These exposed sites are prime sites for non-native species, which can heighten fire risk in the future.

## Study Site

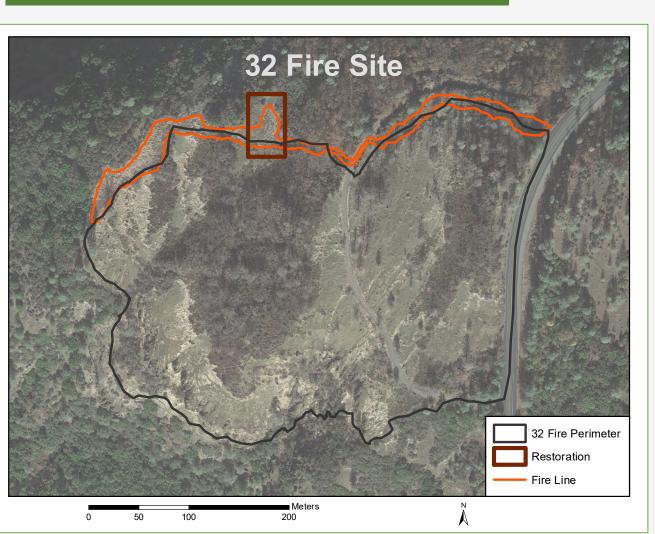


Figure 1: 32-Fire Bulldozed Installed Fire Line and Restoration

Location: SW Cascade foothills NE of Chico, CA

Hectares: 11.33 Date: Sept. 2017

**Site Elev.:** 463–548 m

**Vegetation:** chaparral, oak woodland & annual grasslands

Fire adapted plant species present such as Arctostaphylos spp. & Ceanothus cuneatus – all require fire for germination of seeds found in the seedbank



**Temperature (avg):** Minimum of 0°C in the beginning of January, and a high of 31.7°C in the middle of July

**Precipitation (avg):** Maximum of 16.3 cm of rain at the end of February, and a low of 0.25 cm of rain in the middle of July

#### Plot types:

- 1. Burn 2. Disturbed Fire Line
- 3. Unburned Reference





#### Fire Line:

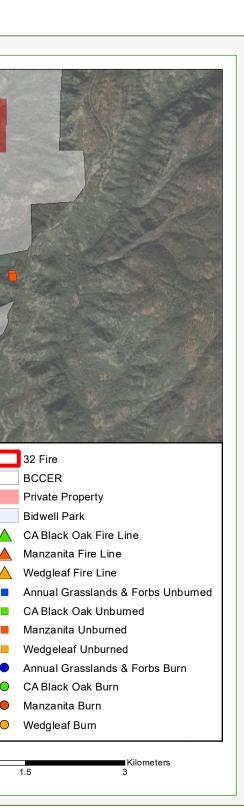
- Installed on the north side of the fire site with a bulldozer to prevent fire from spreading and allow firefighter access
- Width 6–12.2 m

Figure 2: 32-Fire Survey Plots

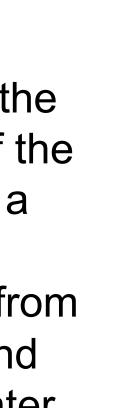
32 Fire

**Study Plots** 

## **Post-fire Plant Trajectory and Fire Line Restoration** Hannah Weinberger, Kristen Kaczynski a noiteioceel California State University, Chico



32 Fire BCCER



### **Research Questions**

- 1. How does disturbance (fire and fire line) affect the recovery and succession of native and non-native plants?
- 2. What fire line restoration treatment will be most successful in preventing non-native species invasion; Mulch replacement (cardboard), Seedling, Seedbank or control?

#### Vegetation Sampling

Vegetation Type	Burn	Fire Line (FL)	Unburned (Reference)
Annual Grasslands (AnG)	4	N/A	4
CA Black Oak (CAB)	5	3	5
Manzanita	3	3	3
Wedgeleaf (Wedge)	3	3	3

Fig. 2: Plant Recovery Trajectory Survey Plot Sample Numbers by Vegetation Type (Vegetation Type from CAL VEG)

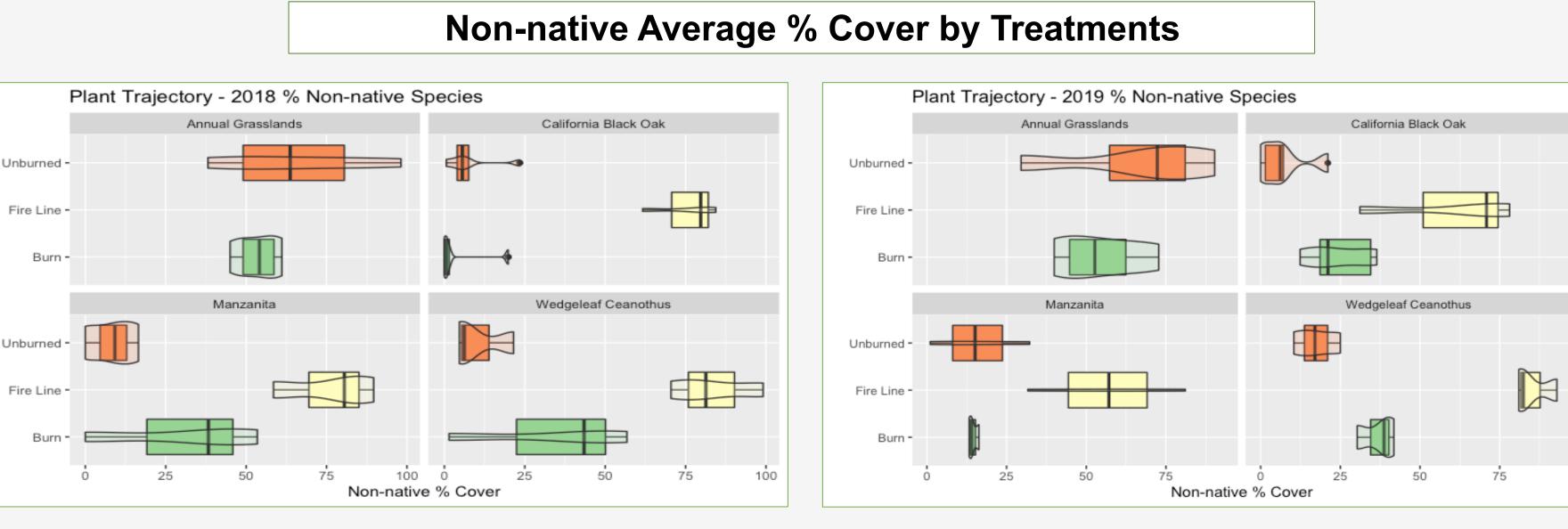
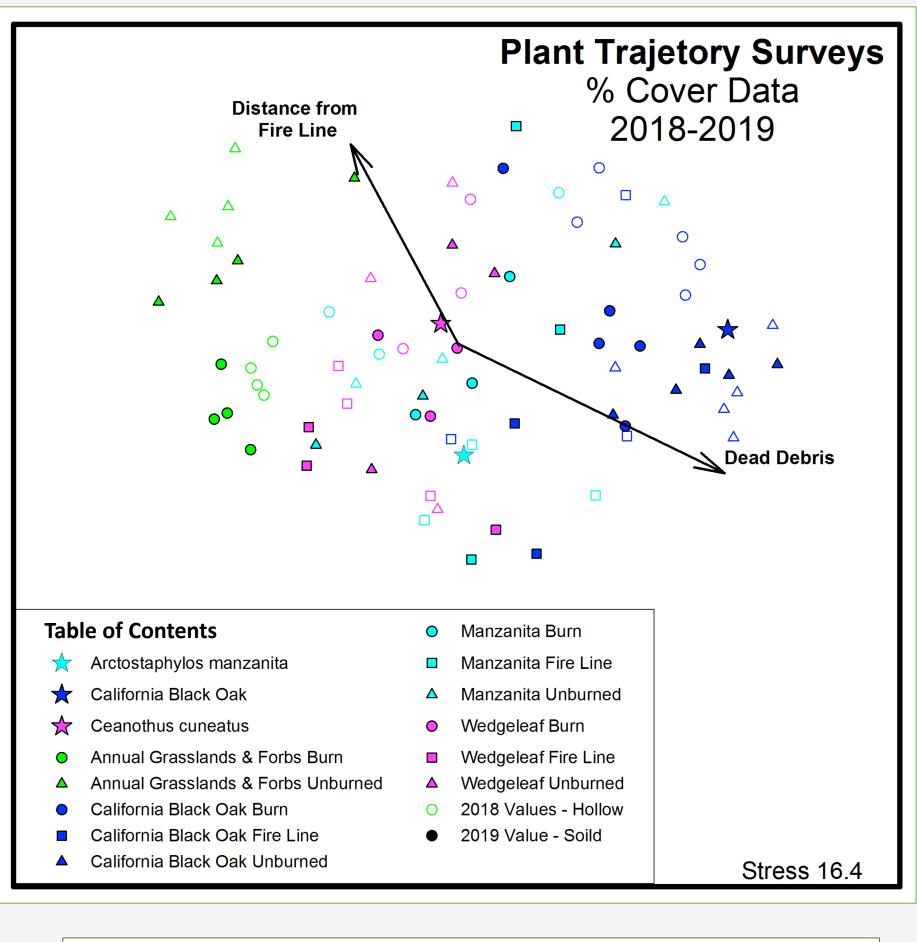
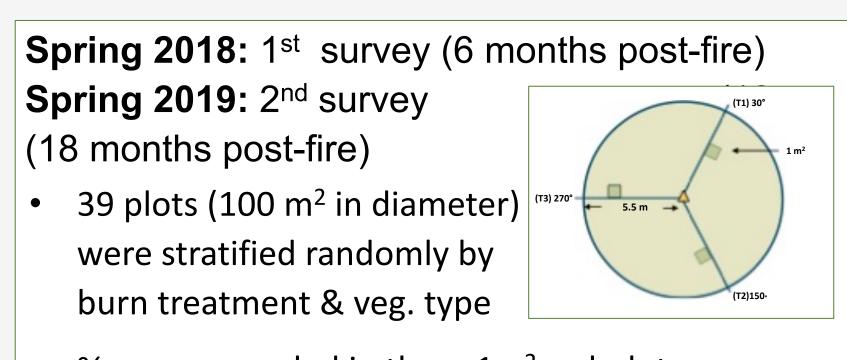


Fig. 3: 2018 Non-native Plant Trajectory Averages

- Fire Line plots have high occurrence of non-native species when compared to respective burned and unburned areas
- Manzanita and Wedgeleaf vegetation did not have primary species of respective unburned or burned vegetation type



Nonmetric Multidimensional Scaling Plot Axes Graphed = 2,3 (k=3)



% cover recorded in three 1m<sup>2</sup> subplots, pres/absence data collected for larger circle plot

	Dianat Tradia atam / Avrana maa
<b>Fig. 4:</b> 2019 Non-native	Plant Trajectory Averages

Bray Curtis Index Comparing similarities of species cover:							
Unburned	CA Black Oak Manzanita Fire Line Fire Line		Wedgeleaf Fire Line				
CA Black Oak	19.9						
Manzanita	4.7	8.7					
Wedgeleaf	5.7	11.2	6.9				
Annual Grasslands and Forbs	CA Black Oak Fire Line	Manzanita Fire Line	Wedgeleaf Fire Line				
Burn	6.4	6.5	19.9				
Unburned	3.6	5.4	14.5				
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#### Sorenson Index

Examining species presence/absence:								
	Annual Grasslands Burn	CA Black Oak Burn	Manzanita Burn	Wedgeleaf Burn				
Annual Grasslands Unburned	48.6							
CA Black Oak Unburned	4.5	25.6						
Manzanita Unburned	31.9	25.6	32.7					
Wedgeleaf Unburned	38.8	36.1	42.7	46.4				

- Sorenson Index utilized due to primary species of Wedgeleaf vegetation type only appearing in presence/absence data in burned area
- Manzanita burn measured with Sorenson for comparison



## **Conclusions & Future Research**

 Regeneration of Manzanita and Wedgeleaf species on site occurs post-fire from the seedbank, so future recruitment in fire line is less likely.

All fire line saw large amounts of non-native cover. Due to this and these areas possibly going away from original trajectory, highlights importance of looking into fire line restoration practices

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Due to high non-native cover in **Wedgeleaf fire line** and high similarity with annual grassland

**communities**, as well as these areas not having primary species of vegetation type, could show this

community may be on a trajectory away from original vegetation type

Additional research will be necessary to better inform fire line restoration practices:

**Research assessing** experimental plantings of fireadapted shrubs for chaparral fire line areas or

burning in fire lines would be beneficial, due to main species being unable to regenerate in areas that remain unburned.

#### Literature Cited

getation Mapping Program, 1920 20th St, Sacramento, CA 95814, http://www.fs.fed.us/r5/rsl/projects Z. & Sieg, C. H. Effects of fire severity and pre-fire stand treatment on plant community recovery after a large wildfire. Forest Ecology and Management 255, 855–865 (2008). onal Institute of Invasive Species Science, Beyond NAWMA Plot Plot. (2018). http://www.niiss.org/cwis438/websites/niiss/FieldMethods/ BeyondNAWMA.php?WebSiteID=1 onal Interagency Fire Center,. Total Wildland Fires and Acres (1926-2017). (2018). https://www.nifc.gov/fireInfo/fireInfo stats totalFires.html , Miller, P. M., Kauffman, J. B. & Kaye, T. N. The Role of Prescribed Burning in Maintenance of an Endangered Plant Species, Lomatium bradshawii. I

# Acknowledgments

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