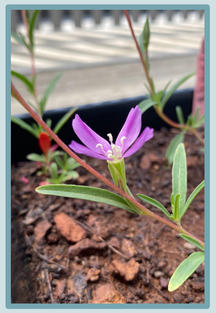

Pile burning reduces soil legacies of non-native annual species

Olivia Parra, Devyn Friedfel, Justin Valliere

Introduction

- **Soil legacies** are alterations to soil properties, by plants, that can persist beyond their above-ground presence
- Invasive species can create soil legacies that are self-perpetuating and hostile to native plant species
- **Burn piles** are aggregations of dead, downed, and dense fuels that are created to reduce fuel loads of woodland plant communities
- Although this fuels management strategy is typically confined to areas of less than two meters, the fire type can have **high-severity impacts** on **soil properties**

Can we strategically pile burn over invasive dominated plant communities to reduce their soil legacies?

Sampling Site

The soil for this study was collected at **Pepperwood Preserve**, Santa Rosa, CA on **Wappo** and **Miwok homelands**. Here, pile burning is used to steward chaparral, mixed evergreen, and grassland plant communities.

Image 1. Soils were collected at Pepperwood Preserve to compare the soil seed bank composition of pile burn scars and in adjacent unburned plots. The plots depicted here are located in a chaparral-grassland transition zone.

Key Findings

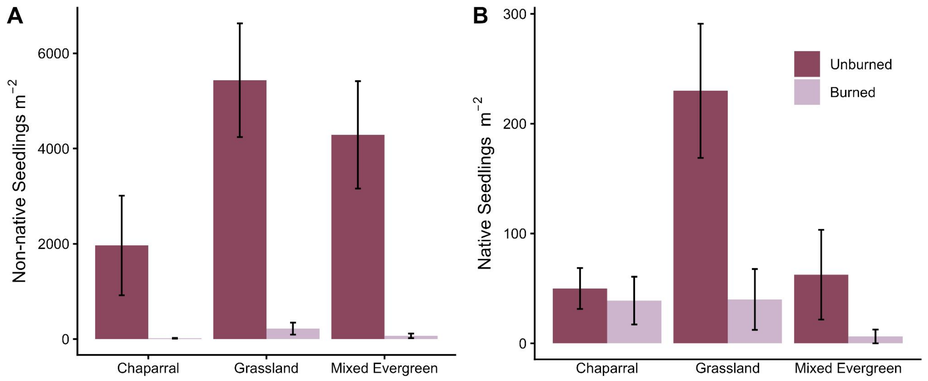

Figure 1. These bar charts depict the mean A) Non-native and B) Native seedlings per m^2 in burned and unburned plots of chaparral, grassland, and mixed evergreen habitats. Unburned plots are shown in dark purple, and burned plots, in light purple. Standard error is shown with black bars.

The results of this study suggests that strategic pile burning over invasive dominated landscapes can directly address at least one non-native legacy, namely their soil seed bank

- On average, pile burning **reduced** the incidence of **non-native plant species by 95-99%** across all plant communities
- **Native plants** were also **less frequent** in burned plots across all plant communities **decreasing**, on average, **by 22-90%**
- **Future directions**: The long term impacts of pile burning on soil properties and legacies as well as the opportunities pile burn scars serve as targets of active restoration should be investigated

Image 2. Here are two seed trays from the grow-out experiment. On the left is the soil harvested from a burn pile scar, and on the right, soil from an adjacent unburned plot. The burned soil has no seedlings while the unburned soil hosts an abundance of non-native seedlings.

Methods

Image 3. Some of the seed trays of the grow-out experiment.

- In the fall of 2024, soil samples were collected from within burn pile scars and in adjacent unburned plots of **chaparral**, **mixed evergreen**, and **grassland** plant communities
- With a trowel, two 10cm^3 samples of soil were collected from each plot and homogenized in a plastic freezer bag
- Plants had begun to germinate due to early fall rains requiring that I count, document, and pluck seedlings to be identified later
- In the following spring, soils were spread in a 10’ x 10’ seed tray over a potting medium for a **grow-out experiment** in a **lath house** at UC Davis
- Trays were watered as needed – typically every third day
- As seedlings became identifiable, I plucked them from the trays, and documented their presence
- Seedlings were then summarized by native and non-native identity and the averages of the two categories were calculated for each plant community
- All seedling totals were then multiplied by fifty to bring the units to meters squared

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Pepperwood

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