Stanford | Jasper Ridge Biological Preserve
'Ootchamin 'Ooyakma
SCHOOL OF HUMANITIES AND SCIENCES

**Prescribed Fire Research Convening**
**Abstract Booklet**
February 18, 2025
8 AM - 12 PM
Convening agenda: https://jrbp.stanford.edu/news/research-convening-prescribed-fire

Abstracts in Alphabetical Order

1. **Coker, Teso, Earth System Science, Doerr School**
   *Assessing Changes in Aquatic Nutrients in Streams and Searsville Lake from Prescribed Burns*
   An overview of nitrogen, phosphorus, and micronutrients of interest in the streams leading to Searsville Lake. The goal was to determine if there was a signal from the prescribed burn in the waterways.

2. **Fufunan, Kiara, Earth Systems Program, and Comparative Studies in Race and Ethnicity, JRBP ('O'O) Intern**
   *Soil biogeochemical response to a prescribed fire in chaparral at Jasper Ridge Biological Preserve*
   The pile burns conducted at Jasper Ridge Biological Preserve ('Ootchamin 'Ooyakma) offer a unique chance to study the biogeochemical effects of prescribed fire on chaparral soil. The burns significantly altered soil biogeochemistry with an increase in pH levels in surface soils and ash. Bio-available Ca, K, Mg, Na, and S levels also increased significantly. Short-term pH increases and nutrient fixes may promote plant growth, but long-term effects of revegetation and nutrient cycling require further study.

3. **Gomez, Bill, Docent, JRBP('O'O)**
   *Camera trapping reveals the impact of fuel reduction on woodrat nesting behavior*
   For many arboreal animals, fuel reduction leads to loss of arboreal access, loss of wood for ground pathways, loss of food sources, nest building material, and disturbance from noise of chipping and chainsaws. For dusky-footed woodrats, this ultimately could drive the abandonment of their nests. Camera footage was captured in the month before fuel reduction, in the month after fuel reduction, and nine months thereafter, to quantify the impact of fuel reduction on woodrat nesting activity.

4. **Huy, Katie, Earth System Science, Doerr School**
   *Impacts of Prescribed Fire on Soil Biogeochemistry and Microbial Activity at Jasper Ridge*
   While prescribed fires are known to mitigate wildfire risk and improve vegetation health, their effects on soil biogeochemistry, particularly carbon and nitrogen cycling, are woefully understudied. Burning releases significant deposits of C and N into the soil via ash. Microbial organisms are responsible for much of the biogeochemical cycling of C and N within the soil, though the depositional environment of these nutrients can also influence their stability. Therefore, in this project, we aim to investigate the interplay of microbial community assembly/activity and soil chemistry/mineralogy on the fate of ash-derived C and N following prescribed fire at the Jasper Ridge Biological Preserve ('Ootchamin 'Ooyakma). Preliminary results show immediate alterations to soil biogeochemistry after burning such as, changes in pH, soil moisture, and concentrations of macronutrients (Ca, K, Mg) and extractable nitrogen (NH4+). In the months following the fire, we also observe impacts on CO2 respiration rates, microbial cell abundance, and activity of pyrogenic-carbon-degrading enzymes, indicative of changes in microbial activity and function.

5. **Dukes, Jeff, Global Ecology, Carnegie Institution for Science**
   *Jasper Ridge Microclimates: Effects of topography, vegetation type, and fire management treatments*
   Variation in topography and land-use history has produced a diverse mosaic of vegetation types across the landscape of Jasper Ridge Biological Preserve (JRBP). These different vegetation types influence local microclimates in distinct ways. How much influence do different topographical settings and vegetation types have on local microclimates? How do fire management treatments affect local conditions? I will discuss the sensors that I have installed in different ecosystems and fire treatment areas and some of the data collected to date.

6. **Lit, Rachel, Earth Systems Program Undergraduate, Human Biology, Living Lab Fellow**
   *Long-term management strategies for wildfire resiliency on Stanford lands*
   Comprehensive land and fuel management strategies are essential in reducing wildfire hazards, especially in vulnerable wildland-urban interface areas, which encompass a large portion of Stanford lands. This Living Lab Fellowship project will focus on evaluating long-term maintenance strategies by comparing benefits

and limitations of tools, and evaluate the feasibility of creating a permanent livestock herd at Stanford for grazing treatments.

7. **Lopez, Alandra, Earth System Science, Doerr School**
   *Biogeochemical response of different ecosystems to prescribed fires*
   We investigate how prescribed fires influence soil biogeochemistry in chaparral and oak woodland ecosystems, focusing on implications for smoke particulate chemistry and post-fire ecosystem recovery. Following the March 2024 pile burns at Jasper Ridge Biological Preserve, we conducted monthly and bi-monthly soil and ash sampling to assess changes in soil mineralogy, organic matter, pH, chemical composition, and metal and nutrient bioavailability. Our findings provide insights into how fire type, vegetation composition, and parent geology shape soil transformations, informing strategies for ecosystem management and resilience.

8. **Neamati, Daniel, Aeronautics & Astronautics, School of Engineering**
   *3D Digital Twins of Environments*
   Sometimes, 2D is not enough. You need to understand the 3D structure of an environment to answer your scientific question or prescribe your sustainable stewardship decision. The NAV Lab in Stanford's Aeronautics and Astronautics Department has begun translating its recent research on urban 3D models to the environmental context with a focus on fire management and stewardship through support from the TomKat Center for Sustainable Energy. At JR'O'O, we recently began researching the ecosystem response to pile burns. With a handheld tablet, we can reconstruct plants surrounding the burn sites, such as the western bewildering bushmallow, to track their growth in 3D. We aim to extend these models to separate chaparral species, estimate the fuel load, and track the seasonality of the ecosystem. Through this 3D monitoring, we strive to aid decision-making about fire-susceptible fuel load reduction options at the wildland-urban interface.

9. **Opperman, Zander, Biology, Living Lab Fellow**
   *To build a pile*
   This poster is an overview of a case study report, “Fire on the Ridge”, that summarizes and synthesizes the events, achievements, and challenges of the March 2024 pile burns at Jasper Ridge Biological Preserve ('Oochamin 'Ooyakma). This report was created as a final project of the Living Lab Fellowship (2023-2024).

10. **Payelleville, Amaury, Biology, School of H&S**
    *Impact of fire on the entomopathogen soil organisms*
    Our ongoing research project on entomopathogenic organisms in the soil at JRBP since February 2023 has allowed us to identify numerous nematodes, fungi, bacteria, and other microorganisms, involved in the regulation of insects in the oak woodland soil. With cultural burns and wildfire at the heart of California's forest environment, we wanted to do a pilot study on the effect of fire on these entomopathogenic organisms by taking advantage of the pile burns at JRBP in early 2024. To do so, we collected soil below 3 piles and one control adjacent location before and after burn. This soil was then use in a Galleria trap experiment to detect what were the entomopathogenic organisms present in the soil. Our preliminary results show a strong impact on these organisms as they are almost completely absent after burn while remaining intact in our control. This work is laying the foundation of further research that will involve wild-fire and cultural burn in a similar context.

11. **Rodriguez, Nick, Biology, JBRP ('O'O) Intern**
    *Arthropod Abundance in Fuel Reduction Plots*
    A shaded fuel break was created in oak woodlands around the perimeter of Jasper Ridge Biological Preserve. This project measured arthropod abundance and diversity across paired treated and untreated plots to help inform future fuel reduction efforts with respect to protecting biodiversity.

12. **Villa, Lydia, Biology, School of H&S**
    *The effects of fuel reduction managements on vegetation regeneration*
    This project explores how different fuel reduction methods (pile burning, mastication, and mowing) affect seed viability and vegetation recovery in chaparral ecosystems. Soil cores were collected in each treatment area, and seeds are being germinated in a greenhouse to evaluate the seed bank's potential. Vegetation regrowth is also being tracked to assess the impacts of these treatments on seed germination and resprouting. By comparing greenhouse results with actual field regrowth, we aim to understand the long term effects on plant communities and inform better fuel management strategies at Jasper Ridge and similar ecosystems.

13. **Wackett, Adrian, Earth and Planetary Sciences, Doerr School**
    *From ashes to atoms: Assessing fallout radionuclide systematics following low- and high-severity fires*

Fallout radionuclides (FRNs) like meteoric 10Be (half-life = 1.37 million yrs), 137Cs (30 yrs), 210Pb (22 yrs), and 7Be (53 days) are widely used to constrain the rates and dates of earth surface processes. Here we tested the null hypothesis that geologically-relevant FRNs behave conservatively during fires by measuring FRN concentrations in topsoils before and after prescribed burning of replicated (n=22) brush piles spanning a geomorphic (ridge, slope, and valley positions) and vegetation (chaparral and oak woodland) gradient at Jasper Ridge Biological Preserve. Preliminary results suggest FRNs are concentrated in charcoal, which implicates substantial biological (re-)cycling of FRNs that are presumed to behave conservatively. These results mirror findings from the Caldor fire, where FRN concentrations in topsoils were enriched by >40%. Our findings suggest fire plays a significant but previously unrecognized role in modulating FRN systematics at earth's surface, with broad implications for (re-)evaluating FRN techniques across the earth sciences.

14. **Yu, Jessica, Doerr School, Woods Institute for the Environment**
*Controlled Smoke: Preparing for the Impacts of Increasing Prescribed Fire in California*
As California seeks to scale up the use of beneficial fire, the potential impacts of smoke from these treatments on communities are expected to grow significantly, particularly for populations already disproportionately affected by air pollution. Gaining a deeper understanding of the role smoke plays throughout the prescribed fire process is crucial to preparing for the future effects of a more than sevenfold increase in beneficial fire compared to current levels.