Small mammals create soil legacies that persist following a major disturbance

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Question: Does the impact of small mammal herbivory on above- and below-ground processes persist after a major disturbance?

Results: Prior to the burn, areas with herbivores had lower plant cover and microbial activity then areas without herbivores. Percent area burned was lower in plots with herbivores; in spite of this, mammal access plots had lower total plant cover and microbial enzyme activity relative to exclosure plots after the burn. Interestingly, soil respiration patterns shifted post-burn. These results may reflect changes in plant community composition.

Summary: Herbivory altered plant and soil processes even after a major disturbance, but the patterns were not always consistent.

Experimental design: In 2008, twenty 4m x 8m rectangular plots were constructed. Plots consist of galvanized hardware cloth, extending 82cm aboveground, sunk into the ground 40 cm to prevent burrowing underneath, and have aluminum flashing around top perimeter to excluding climbing mammals. 10 plots have holes cut in the cloth to allow small mammal access, while exclusion plots remain intact.

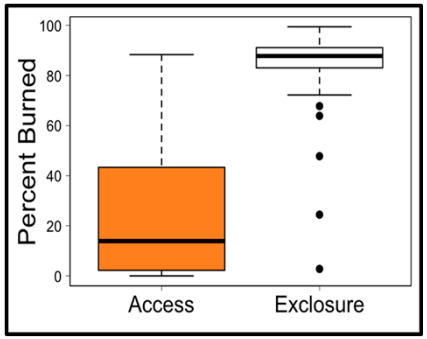

Fig. 1. Percent of access and exclosure plots burned. Exclosure plots consistently burned more.

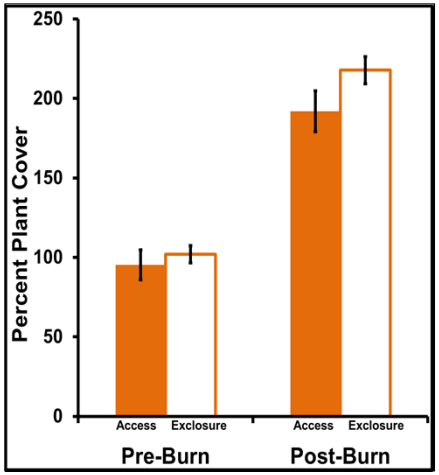

Fig. 2. Prior to the burn, small mammal activity did not alter total plant cover between the treatments. However, after the burn, mammal access reduced plant cover relative to the exclosure plots. These patterns could be due to inputs from ash or changes in competition within the plant community.

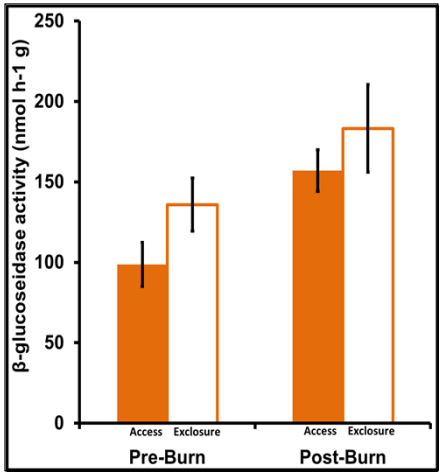

Fig. 3. Potential carbon degrading (β-glucosidase) enzyme activity was higher in exclosure relative to access pots. Overall activity was higher post-burn then pre-burn and patterns between access and exclsure plots remained the same. These results suggest that increases in plant derived carbon, or direct inputs from ash, could be increasing microbial activity.

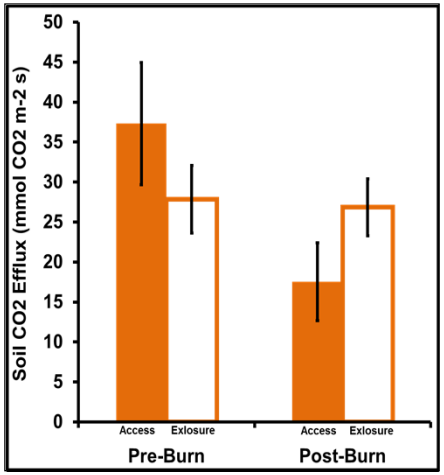

Fig. 4. There was a time × treatment interaction where soil carbon efflux was similar in access and exclosure plots prior to the burn, but exclosure plots had greater carbon efflux relative to access plots after the burn. A shift in plant or microbial community composition or biomass could be causing this pattern. This is an area we plan to follow up on in future experiments.