



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Tai L. Michaels	Project Number 38510
Project Title Effects of Short Fire Return Intervals on Chaparral Ecosystems	
Abstract Objectives/Goals Fire return intervals (FRIs) are a key environmental factor in chaparral ecosystems. With increasing drought and anthropogenic fire ignition particularly in the past decades, dangers with short FRIs are increasing. I examine the impacts of short FRIs on diversity, coverage, and flammability several decades afterwards. 10 pairs of nearby quadrats with differing FRIs were selected and transects were taken recording presence of individual species in either canopy or understory. I found significant decreases in shrub canopy coverage and net canopy coverage in short FRI sites. Short FRIs also increased the spread potentials of fires while decreasing the intensities of fires. These changes suggest that short FRIs form a positive feedback loop increasing flammability which then increases the probability of further short FRIs. The decreased intensity may cause greater invasive species dominance and could further increase fire risk. These findings suggest that fire management should place a greater premium on controlling fires in areas with recent burns or previous short FRIs in order to reduce future fire risk and further ecological degradation. Implementation of these practices could help reduce risk to property and lives from fires and the landslides, floods, and air pollution that follow. Methods/Materials Used fire maps to identify nearby pairs of sites with differing intervals between fires. Sampled sites recording canopy and understory species presence at points along transects. Calculated cover by growth form, diversity, and flammability (FFI model from USFS). Results Diversity and canopy cover (particularly shrubs) decreased with short FRI sites. Fire spread potentials rose while flame available fuel decreased in short FRI sites. Changes in cover for other growth forms and understory plants were not significant. Conclusions/Discussion This study implies that the decreased canopy cover caused by short FRIs increases the flammability of an ecosystem. The decreased available fuel suggests lower intensity fires which may benefit invasive species. These results support the hypothesis that short FRIs increase risk of further fires in a positive feedback loop.	
Summary Statement In studying the effects of short intervals between fires (FRIs) in chaparral ecosystems, I find that they damage the canopy, reduce fire intensity, and lead to greater flammability increasing the likelihood of more short FRIs in the future.	
Help Received I received advice from Dr. Valliere on narrowing in on a research question.	