Meta-Analysis of Fire Hazard Assessments within the Sierra Nevada of California

Background/Question/Methods

Nearly a century of fire management in the Sierra Nevada of California has had the unintended consequence of placing millions of hectares of forest at risk of catastrophic fire. Several management actions have been proposed to modify fire behavior on the forest landscape. One approach is based on the theory that disconnected fuel treatment patches that overlap in the direction of the head fire spread reduce the overall rate and intensity of the fire. Simulations have shown that with as little as 30% of the area in these strategically placed area treatments (SPLATs), fire risk can be decreased for the entire landscape. Another is a Defensible Fuel Profile Zone (DFPZ) that is composed of interlocked landscape fuels breaks designed to provide safe access for fire fighters, limit fire behavior to prescribed levels, and create conditions in which canopy fires are less likely to spread. Despite sound conceptual underpinnings for both approaches, there is uncertainty regarding their efficacy in modifying fire behavior.

As part of the Sierra Nevada Adaptive Management Program’s (SNAMP), we compared the performance of a range of management strategies currently being implemented on US Forest Service lands in the Sierra Nevada. Five studies were selected based on their data availability: Sagehen Experimental Forest, the Last Chance SNAMP research site, and the Sugar Pine SNAMP research site all are implanting SPLAT treatments while the Plumas-Lassen Administrative Study has implemented DFPZ treatments. For comparison, we have also included the Kings River Experimental Watershed where an uneven-aged management strategy is planned. A uniform landscape level fire hazard assessment was conducted across all studies using FLAMMP. Four major fire behavior outputs (Crown Fire Activity, Flame Length, Minimum Travel Time, and Fire Line Intensity) were compared between pre and post treatment scenarios for two fire weather conditions (90th and 97.5th).

Results/Conclusions

Initial results indicate that all management strategies were successful at changing fire behavior to differing degrees. Both real-world SPLAT and DFPZ designs seemed to work as predicted. For example SPLAT fuel treatments that covered approximately 1/3 of Sagehen Creek Basin could be arranged in the landscape so that key aspects of the fire behavior were modified for the entire fireshed. The highly detailed field approach proved to be generally consistent with landscape level datasets (ie LANDFIRE) when designing fuel treatments. And most importantly, the judgment of local experts is essential to obtaining models with realistic fire behavior and support from affected communities.
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