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The effect of pre-fire fuel manipulations on alien plant invasion

Federal, state, and local agencies are currently implementing large-scale pre-fire fuel manipulation programs to reduce the threat of catastrophic wildland fires. An unexpected result of these fuel reduction programs may be the introduction of invasive alien plant species. The establishment of alien plants within fuel treatments is a serious concern because many treated areas, such as fuel breaks, extend into remote wildland areas. These areas might become more susceptible to widespread invasion, particularly following disturbances such as fire, once alien species have established a nearby exotic seed source. This study investigates the effect of fuel breaks on alien plant invasion, and evaluates the spread of alien species into adjacent wildland areas. We examined fuel breaks in a range of different plant communities, including shrubland and forest types, throughout California. Data were collected on plant cover, density, and species composition, and environmental and anthropogenic variables such as canopy cover, soil, ground cover, slope, aspect, elevation, fire history, and land use. We found that the abundance of alien species is significantly higher within fuel breaks than in surrounding wildland areas, and that older fuel breaks support a higher abundance of alien plants than newly constructed ones. Alien species are most likely to spread into adjacent wildland areas that have experienced numerous or recent fires, and into areas that are grazed by livestock. Our data suggest that fuel breaks provide establishment sites for alien plant species, and that adjacent wildland areas are susceptible to invasion after widespread disturbances such as fire and grazing.