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PATTERNS AND DRIVERS OF LONG-TERM CHANGE IN SAGEBRUSH-STEPPE VEGETATION COMMUNITIES

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The sagebrush-steppe of the inter-mountain western United States is threatened by changes to fire regimes caused by invasion of the alien, annual grass *Bromus tectorum* (cheatgrass) and by increasing anthropogenic ignition frequencies. Big sagebrush (*Artemisia tridentata*) dominated vegetation provides a wide range of ecosystem services including habitat for a number of rare endemic species. Despite much research into the relationship between fire and vegetation change in these communities, very few long-term studies exist that allow us to examine the effects of compounded disturbances. Permanent vegetation monitoring plots were established in an around the Arid Lands Ecology Reserve (south-central Washington State) in the early to mid 1990s, and cover a wide range of abiotic conditions. Since their establishment, the plots have variously been impacted by one or more large wildfires and by post-fire restoration efforts including drill and aerial seeding of native species, herbicide application and out-planting of sagebrush seedlings. A number of the plots have, however, remained relatively undisturbed. Here we 1) describe key community groups, 2) track changes in community composition over time and 3) understand the relative importance of fire, restoration, edaphic conditions and broad plant functional traits in driving vegetation change. Cluster analysis suggested that initial composition was a function of both edaphic characteristics and historical fire frequency. Multivariate control charts provided a useful tool for visualising changes in community composition and demonstrated that change is a function of both community-type and fire frequency. Regression trees demonstrated that fire frequency was the key driver of the degree of change but that the effects of fire interacted with elevation, soil type and initial community group. Restoration treatments appeared to have had little impact on rates of post-fire recovery. Patterns of resilience can be explained by the functional traits of dominant species and by elevational differences in site productivity.