Climate and fire regime interactions on long-term persistence of sagebrush (*Artemisia* spp.) ecosystems

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Abstract

Forecasting species distributions in association with scenarios of future climate and disturbance regimes is critical to inform management and conserve ecosystem biodiversity. Species distribution models (SDMs) have provided a useful statistical technique for extrapolating species–environment relationships into future climate scenarios. As a statistical tool, however, SDMs assume constant species-environment relationships and fail to consider emergent outcomes of non-linear interactions between species' ecology and novel climate-environment situations including fire regime. SDMs are also typically course in spatial resolution owing to limitations of downscaled global circulation models and likely undervalue the importance of microrefugia in terms of favorable climate and fire-safe for persistence in complex terrain. We are developing an agent-based-model (ABM) of sagebrush establishment, growth, dispersal and mortality linked in an ecohydrological-context to climate change scenarios at watershed scales. Static properties of complex terrain (elevation, slope, aspect, soils) impose first order controls on soil-moisture and minimum temperature, influencing sagebrush establishment and survival; and simulation experiments further investigate the interactions of these first-order controls with temporally-dynamic scenarios of changing water input, temperature and fire frequency on sagebrush persistence in a spatially-explicit-probabilistic sense through time.