Climate change/land use change scenarios for assessing threats to ecosystem services on California rangelands

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There are over 11 million acres of grasslands in the California Central Valley and the interior Coast Range, most of which are privately owned and managed as rangelands for livestock production. These ranches provide habitat for 75 threatened and endangered species, and generate multiple ecosystem services. As part of the California Landscape Conservation Cooperative, we developed spatially-explicit integrated climate change/land use change scenarios for the Central Valley and chaparral and oak woodland eco-regions out to 2100 based IPCC Scenarios A1B, A2, and B1. Scenario storylines relevant to California rangelands were developed with input from the ranching community, local experts on land use change, and historical land use data. Modeling was conducted through the USGS National LandCarbon Project. We integrated downscaled California climate projections at 270 meters and related hydrologic model outputs on climatic water deficit, runoff and recharge with the FORE-SCE land use change model to produce maps of possible future changes to 14 land use/land cover classes. Model outputs identified how alternative future development patterns, extent of irrigated agriculture, and climatic conditions could potentially threaten the ecosystem services of wildlife habitat, groundwater recharge, and carbon sequestration on rangelands. Using model results, the relative economic costs and benefits associated with change in rangeland ecosystem services were calculated for each scenario.