



Point Blue Publication Brief

Assessing the effects of rangeland management practices in California through a systematic search of the literature

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The state of California is increasingly promoting soil stewardship on working lands as a way to help achieve multiple goals, including improved forage production and climate change mitigation. For example, rangeland soil management is now called upon by the California 2030 Natural and Working Lands Climate Change Implementation Plan as a critical climate change mitigation strategy, and The California Department of Food and Agriculture's Healthy Soils Program aims to maximize this outcome. However, the effects of rangeland management in California may be small relative to strong variability in climate, soil type, and land-use history.

We reviewed published literature to explore how prescribed grazing, silvopasture, compost amendments, and riparian restoration influence a suite of soil and plant-related metrics across California.

We assessed data on soil parameters that are potentially responsive to management and

relevant to soil health, as well as data on aboveground forage production, forage nitrogen content, and herbaceous species richness.

Levels of within-state information about these four management practices vary substantially, falling in descending order: oaks > grazing > compost amendments > riparian restoration. The presence of oaks had the largest effects on soil properties, with soil organic carbon, microbial biomass, and other measures of soil fertility increasing beneath oak canopies. The presence of grazing increased compaction and total N, and decreased pH. In contrast, compost applications did not significantly affect any of the measured soil parameters, but did boost forage production. In some cases, soil clay content moderated management responses, illustrating that soil texture is an important variable to consider.

In addition to more traditional research approaches, demonstration projects

supported through the Healthy Soils Program offer one promising avenue to gain additional data, as does monitoring associated with Carbon Farm Plans and state-funded projects through the California 2030 Natural and Working Lands Climate Change Implementation Plan.

Main Points

Rangeland stewardship is increasingly expected to promote above- and below-ground ecosystem services.

We evaluated the effects of grazing, silvopasture, compost amendments, and riparian restoration on some of these services in California.

The presence of oaks had the largest effects on soil properties, creating strong "islands of fertility".

Neither grazing nor compost amendments were shown to influence soil carbon significantly.

The effects of riparian restoration could not be quantified due to lack of data within the literature.

Carey, C.J., Gravier, K., Gennet, S., et al. 2020. Supporting evidence varies for rangeland management practices that seek to improve soil properties and forage production. *California Agriculture* 74: 101-111. DOI: 10.3733/ca.2020a0015