

# Sagebrush Steppe Climate Change Vulnerability Assessment



## Brief for Resource Managers

### Carbon cycling in sagebrush steppe under climate change

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The primary goal of this project was to assess the effect of climate change on carbon cycling in mature sagebrush ecosystems. We used initial soil characteristics and carbon values for three locations and modeled future climate at those locations for four different climate scenarios. We found that mature sagebrush ecosystems continued to act as carbon sinks into the future under all different climate change scenarios (Fig. 1). The magnitude of carbon storage differed depending on initial conditions and soil characteristics at each site. Climate change may affect the potential for sequestration by increasing carbon loss through respiration, but we found that increased losses were offset by increased gains through greater primary production. The implication for management is that the sagebrush biome has potential for continuing carbon sequestration into the future. Disturbances such as fire and agriculture are likely to have much greater impact on the carbon storage potential of sagebrush biomes than climate change alone.

#### Management Implications

- Sagebrush ecosystems have the potential for continued carbon sequestration even under climate change.
- Disturbances such as fire and cultivation are likely to have much greater impact on the carbon storage potential of sagebrush biomes than climate change alone.

#### Most Relevant References:

Cleary MB, Pendall E, Ewers BE. 2010. Aboveground and Belowground Carbon Pools After Fire in Mountain Big Sagebrush Steppe. *Rangeland Ecology & Management* **63** (2), 187-196.

Shrestha G, Stahl PD. 2008. Carbon accumulation and storage in semi-arid sagebrush steppe: Effects of long-term grazing exclusion. *Agriculture, Ecosystems & Environment* **125**, 173-181.

Svejcar T, Angell R, Bradford JA, et al. 2008. Carbon fluxes on North American Rangelands. *Rangeland Ecology & Management* **61** (5), 465-474.

### Net Ecosystem Carbon Balance - DayCent

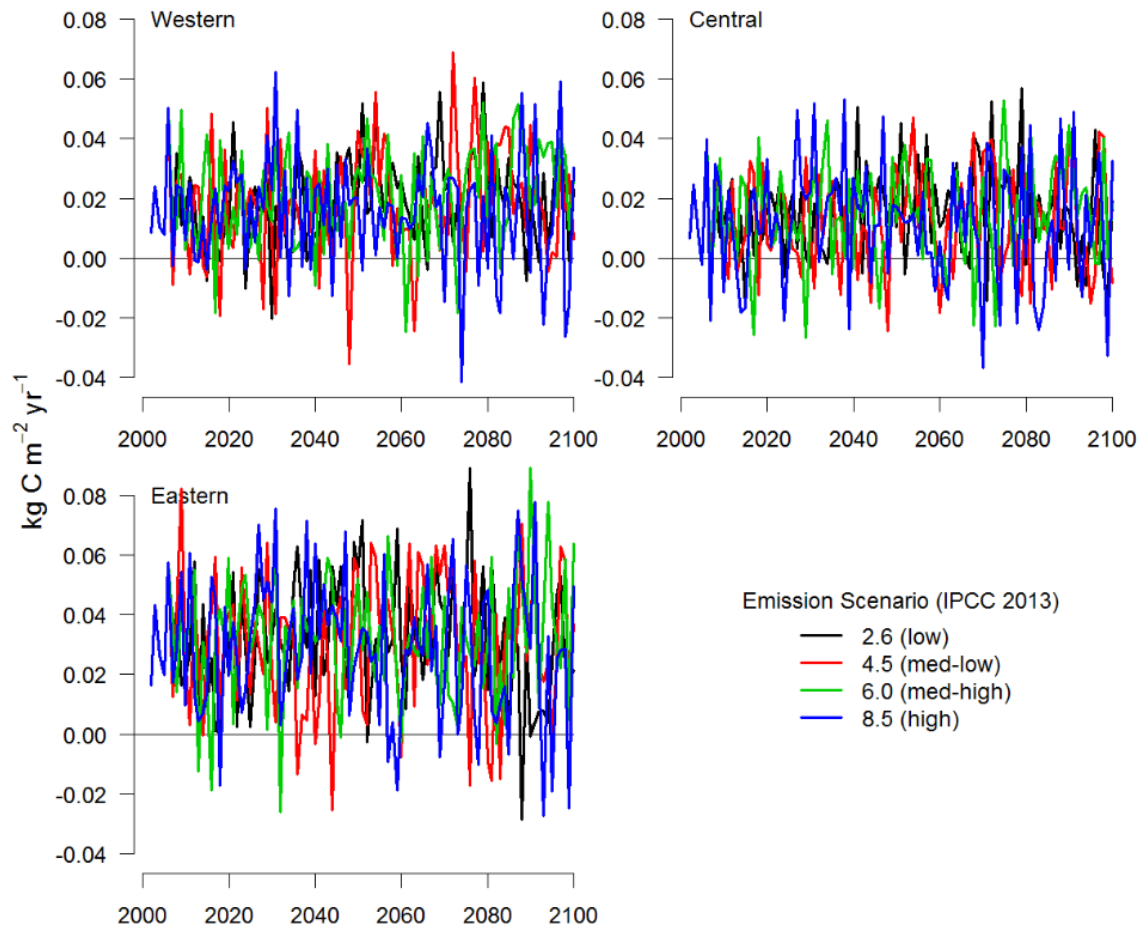


Fig. 1. Net ecosystem carbon balance, total C current year minus total C previous year, for three sites in the sagebrush steppe biome.