

**Climate Action Reserve Soil Enrichment Protocol Version 1.0 Public Comment  
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p. 3 & 4 – “Project activities must not decrease carbon stocks in woody perennials on the project area.”

This has potential to limit management practices aimed at improved grazing and increased productivity of grasslands in areas where encroachment by aspen and other woody species reduces carrying capacity. There is evidence that encroachment of woody species into certain grassland ecosystems (e.g. tall grass prairie) may negatively impact carbon sequestration on pastures. Pinno and Wilson (2011) studied the impact of woody encroachment of grasslands on sandy soil near Regina, Saskatchewan. They found that total ecosystem carbon (above + below ground) was higher in forest ecosystems than in shrubland or grassland; however, soil carbon alone was significantly greater in shrubland or grassland than in forest. Another study, done in the southwestern USA (Jackson *et al.*, 2002) found that dry locations gained ecosystem carbon with woody encroachment, but the wetter tallgrass prairie site lost ecosystem carbon as a result of encroachment. Therefore, allowance should be made in the protocol for control of woody species encroachment into grasslands if it can be shown that total carbon sequestration will increase as a result.

Jackson, R.B., Banner, J.L., Jobbagy, E.G., Pockman, W.T., and Wall, D.H. 2002. Ecosystem carbon loss with woody plant invasion. *Nature*, Vol. 418-8: 623-626.

Pinno, B.D. and Wilson, S.D. 2011. Ecosystem carbon changes with woody encroachment of grassland in the northern Great Plains. *Ecoscience*, 18(2): 157-163.