SageSTEP

Sagebrush Steppe Treatment Evaluation Project

Capturing the Big Picture: Research Results

For eight years, SageSTEP has been working to fill a void. Sagebrush communities in the Great Basin are highly threatened, with half of the original area already lost to cheatgrass invasion and juniper encroachment. These landscape changes have increased fire risk. They've reduced forage, water, and wildlife habitat, including that of the Greater Sage-Grouse. Management efforts to reset the balance of vegetation in the Great Basin and surrounding areas have been hampered by lack of information. Managers needed more information about the effectiveness of different types of restoration practice like prescribed burning and herbicide application. They needed feedback on how the overall ecosystem would react to treatments. They needed research conducted over multiple sites, yielding data that recorded change over time which could be applied to local circumstances.

In 2006, SageSTEP scientists and their manager partners began using restoration treatments at 18 study sites – prescribed fire, clearcutting, mastication (tree shredding), mowing, and herbicides. They studied response to these treatments across the landscape – in vegetation, the fuel bed, soils, water, erosion, wildlife, and invertebrates. Collaborators at universities and government agencies in six western states are now working together to analyze and interpret field data and have already reported many results: in our newsletter, in conferences and workshops, in tours, and in scientific journals. Our long-term presence and focus on outreach have made SageSTEP a familiar name for those working in sagebrush-steppe systems.

On the back of this sheet are some important short-term results of the SageSTEP experiments through the third year after treatment. As times passes, SageSTEP will be able to provide even more meaningful information about these kinds of tradeoffs, as ecosystem components begin to stabilize after their initial short-term responses to the treatments.

Where We are Headed

Our research sites continue to change, and we continue to observe shifts in longer-term responses. Our outreach program offers products and events that share what we have learned. We welcome suggestions for outreach products managers need.

There are many individuals who could benefit from the information produced by this project and others like it. The mobility of employees at government land management agencies creates an endless stream of new individuals to reach.

We have plans to continue monitoring through 2015, which would give us between 7 and 9 years post-treatment response information. As this horizon approaches, we will be able to determine if there is a need to monitor even further into the future.

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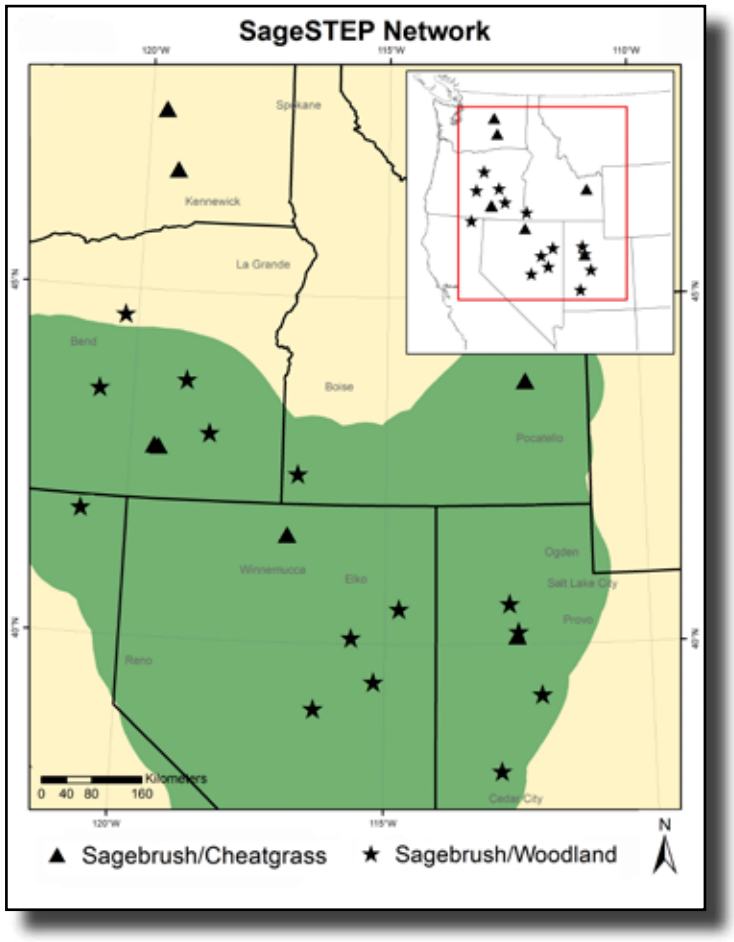
May 2013

A Sample of our Research Results

Woodland-Encroached Sagebrush Steppe

Fire Behavior Consequences. After tree removal, we expected prescribed fire and shredding to create conditions to lower wildfire *intensity* should a fire occur. Potential wildfire *severity* would likely be lower only in areas previously treated by prescribed fire, due to the removal of surface fuel. We confirmed this prediction after the Big Pole fire burned through the treated Stansbury site in 2009 – perennial grass survival after wildfire was much higher in the prescribed fire plot compared to plots either left alone or treated mechanically.

Native versus Exotic Vegetation. Cheatgrass and native perennial grass cover declined immediately after burning, but increased in post-treatment years 2 and 3; native perennial forbs increased after both burning and mechanical treatments. Biological soil crusts declined after fire and had not recovered by post-treatment year 3.



The SageSTEP Network includes sites in six states in the Great Basin and surrounding sagebrush steppe lands.

For more information visit:

www.sagestep.org

Carbon. Carbon management goals parallel those of fuel and vegetation management – maintaining low density woodlands with healthy herbaceous vegetation pays off in the long run, by incorporating relatively more carbon into the soil.

Greater Sage Grouse. Tree removal at most woodland sites increased cover of the annual forb component of sage grouse food, and generally improved structural habitat conditions that grouse prefer. Response of sagebrush steppe song birds was so subtle, however, that it is still unclear whether restoration treatments might lead to population increases of either song birds or grouse.

Erosion and Runoff. Encroached sagebrush steppe woodlands pose a risk of soil loss in the event of a severe wildfire, especially if followed by convective storms. Tree removal by prescribed fire decreased runoff from tree interspaces but increased runoff from tree coppices, with effects expected to decline after a few years. Mastication decreased runoff across the hillslope by leaving shredded debris that increased water infiltration rates.

Social Acceptance. Between 2006 and 2010, Great Basin residents became more aware of threats facing rangelands, were more interested in having a role in making management decisions, and were slightly more positive about their interactions with agency personnel.

Economic Incentives. Treatment in vegetation having *intermediate* levels of invasive infiltration or fuel loading provides the highest fire suppression cost savings.

Lower Elevation Wyoming Big Sage

Fire Behavior Consequences. Mowing reduced shrub cover in a spatially homogenous way, and is expected to decrease fire *intensity*, making these sites more defensible in the event of wildfire. Prescribed fire, however, was the only treatment that was effective in decreasing potential fire *severity*, due to surface fuel reduction.

Vegetation. Prescribed fire and mechanical treatments increased both cheatgrass and native perennial grass cover with time. The annual herbicide imazapic reduced cheatgrass cover for three years after treatment, but also decreased native forbs and perennial short grasses.

Carbon. Below ground organic carbon stocks of bunchgrass-dominated stands exceeded those of cheatgrass-dominated stands, particularly in deeper soil. Efforts to shift the balance of grasses toward native perennials may pay off for carbon management in the long run.

Butterflies. Prescribed fire caused an increase in butterfly abundance and richness, due to increased nectar for adults, and enhanced host plant food for larvae. The broadleaf herbicide tebuthiuron decreased white butterfly numbers, possibly to direct effects on larvae during development.