

Walker Butte Western Juniper Site Field Tour and Post-Treatment Observations

Now that some of our research sites have seen two growing seasons following treatment, we are able to make observations that can be helpful in managing similar locations across the region. The western juniper study site at Walker Butte in Oregon was treated in fall 2006. As part of our Oregon workshop for managers in May, Dr. Rick Miller of Oregon State University led a field tour at Walker Butte. The primary objective of the field tour was to look at steps managers can take to identify a site and determine whether or not the site is a good candidate for restoration treatments. Dr. Miller has developed a series of questions to assist managers in determining where on a landscape to treat in order to achieve management objectives for western juniper systems. These questions direct managers to identify the ecological characteristics of the site, assess the current state of the site, compare the site with the surrounding landscape, and select the most appropriate management action, if any. In this article, we discuss some examples covered on the Walker Butte field tour and their implications for management of similar sites.

The Walker Butte Site

The Walker Butte SageSTEP site is managed by the Bureau of Land Management (BLM) near Christmas Valley, Oregon (for a map of treatment locations see <http://www.sagestep.org/locations.html>). It has three 45-acre core plots: prescribed burn, mechanical, and a control. The BLM applied treatments at Walker Butte in the fall of 2006. In the spring of that year a Lakeview BLM fire crew had cut

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Please send questions or comments on this newsletter to summer.c.olsen@usu.edu.

 Sagebrush Steppe
SageSTEP
Treatment Evaluation Project
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Two different vegetation transects on the same subplot at the Walker Butte study site A) in 2006 prior to burning, and B) in 2007, one growing season after the prescribed fire.

one-third of the trees within the burn plot and girdled those that were left standing. This resulted in nearly 100% tree mortality after the fire, while the understory burn was patchy due to a lack of herbaceous fuels. On the mechanical plot, all trees were cut with a chainsaw and left on site; limbs were not severed from the trunks. The control plot was left untreated. Treatments at this site were implemented for research purposes and thus are not an exact representation of management action.



**Walker Butte
prescribed burn,
fall 2006.**



Identifying the Site

The field tour group discussed what kinds of evidence to look for in determining if the persistent plant community historically has been a shrub-steppe community, a woodland occupied by old-growth trees, or a young western juniper stand that is reestablishing from a past disturbance. In these semi-arid ecosystems large wood persists for hundreds of years, and the group searched for old stumps and downed logs across the site. They found a low density (less than 1/acre) of old burned stumps across the site in addition to well-preserved sagebrush and bitterbrush skeletons beneath the canopies of 80- to 100-year-old trees.

The group discussed the importance of describing characteristics of a site, including the identification of the ecological site, soils, and plant composition. The Walker Butte site has frigid fine loamy, mixed soils, and common vegetation at the site includes western juniper, mountain big sagebrush, and Idaho fescue. By looking at the current vegetation, evidence of old remnant wood, and determining the soils, topographic position, and the ecological site we were able to

reconstruct the plant community that likely has been most persistent for the past several centuries. This information also allows us to address the question: What is the threat for weed invasion on this site? A site mapped as frigid rather than mesic, and with the dominant grass as Idaho fescue, indicates a relatively cool site, with a low risk for invasion by cheatgrass following fire.



Scientists and managers discuss the characteristics of western juniper woodlands on the Walker Butte Field tour in May 2008.

When researchers and managers discuss treatment of woodland sites, questions often arise concerning old-growth trees. One of the most important features of a stand to look for when considering treatment is whether the stand has old-growth trees. On the field tour, Dr. Miller discussed the morphological characteristics that distinguish relatively young trees (less than 150 years old) and old trees that persisted prior to Euro-American settlement. These characteristics include bark, canopy shape, and



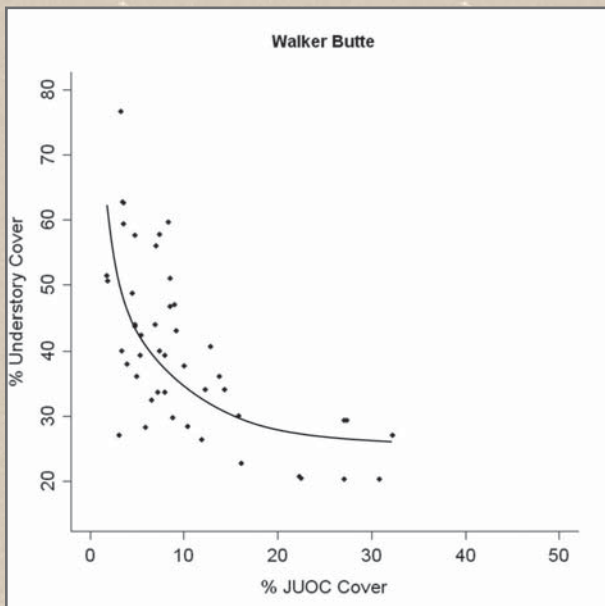
Old-growth western juniper, Connelly Hills, south-central OR.

leader growth of both young and old trees on the site. Old-growth trees have very limited leader growth regardless of tree density. However, in young trees, leader growth indicates the degree of site occupancy or dominance by the trees. Trees with 4 to 6 inches of leader growth have plenty of resources for growth; 2 to 4 inches indicates limitations that could be the result of competition among trees or limited resources on the site; less than 2 inches usually indicates severe competition among trees, which occurs in phase III woodlands.

At Walker Butte, we found a few scattered old-growth trees on rocky outcroppings in the control plot, but no old-growth trees in the other study plots. We confirmed that the majority of trees in the area were post-settlement age, and that our prescribed fire and mechanical treatments did not impact existing old-growth trees. Had there been old-growth trees within the treatment plots, these trees would have been excluded from treatment.

Assessing the Current State of the Site

Evidence discussed above indicates that for the past several hundred years the Walker Butte site was a mountain big sagebrush-bitterbrush grassland with Idaho Fescue and other perennial grasses dominating the understory with a widely scattered stand of trees, located mainly in rock outcroppings.



Prior to treatment, the Walker Butte site was hit by Aroga moths that took out most of the sagebrush in the interspaces. In general, understory cover is low regardless of tree canopy. There is a weak relationship between grasses and tree cover but due to the lack of a restrictive layer and the predominate grass being Idaho Fescue there is a decent grass cover where tree canopies are more dense.

The soils contain a mollic horizon suggesting that grasses have been an important component of the plant community for hundreds, if not thousands, of years. Current tree densities are greater than ten-fold that of historic stands, and current shrub and possibly grass levels are comparatively low, signifying that tree encroachment has played a significant role in altering this system.

Comparing to the Surrounding Landscape

Selection of the Walker Butte site was based on research criteria rather than a particular management objective, so landscape considerations were not as influential as they might be in other cases. However, we can draw some conclusions from observing the surrounding landscape. In the past, this landscape was dominated by sagebrush and deep-rooted perennial grasses, providing habitat for many wildlife species including sage-grouse habitat as well as forage for livestock. An important reason for selecting the area to treat would be to maintain and restore sagebrush steppe habitat for wildlife species.

Selecting Management Action and Site Response

Part of the field tour discussion centered on what questions to ask when making decisions about whether or not to implement restoration treatments. Understory composition heavily influences plant succession following treatment, and ecological site, including elevation and landscape composition, can affect community resistance to or risk of weed invasion. On the Walker Butte site much of the area had retained a good cover of deep-rooted perennial grasses with Idaho Fescue the dominant grass prior



Walker Butte burn plot one year after the prescribed burn. Notice the abundance of native perennial grasses present.

to treatment. Following treatment a good native grass and forb cover still persisted. Researchers attributed the limited response of cheatgrass (cover less than 1%) following treatment to good cover of native grasses—especially Idaho fescue (which usually occurs on colder sites than those dominated by bluebunch wheatgrass or Thurber’s needlegrass)—and cooler temperatures resulting from the 4500 ft elevation of the site. Both factors greatly reduce the risk of increased cheatgrass following mechanical or fire treatments.

Implications for Similar Sites

The Walker Butte site differs from the other SageSTEP western juniper sites in that it has relatively low sagebrush cover due to insect herbivory and lack of a soil restrictive layer. The site also differs in that historically it had a low density of widely scattered juniper trees growing across the site. On the other sites, if pre-settlement trees were present, they occurred on fire-safe micro-sites (shallow, rocky soils). This site is cooler than the Bridge Creek site (which is mapped as mesic), increasing resistance to cheatgrass invasion. Soil and air temperatures are more similar to Five Creeks and Blue Mountain, where invasion and competition from cheatgrass should be limited.

Results from the research being conducted at Walker Butte, and throughout the SageSTEP network, is not intended to be exclusive to the locations where the work is taking place; this information can be useful when evaluating similar ecosystems throughout the Great Basin. Western juniper sites occur across a range of ecological sites and soils that support big sagebrush and are representative of mountain and basin big sagebrush cover types susceptible

to encroachment by western juniper. The range of environmental conditions at sites across the SageSTEP network will allow us to determine under what set of conditions we have the greatest level of success and where the risk of failure could still be high.

The SageSTEP user’s guides provide similar information to that discussed in this article, and results from research at all SageSTEP sites is enhancing the information provided in these guides to help managers make decisions about restoration on the ground. A user’s guide for western juniper systems (*Western Juniper Field Guide* by Miller and others) is currently available online at <http://pubs.usgs.gov/circ/1321/>, and distribution of a similar guide for pinyon-juniper systems is planned for early 2009.

Managers in various locations throughout the Great Basin are already using information from these guides for short- and long-term management planning, including NEPA planning. Managers at the Modoc National Forest in northern California cited the *Western Juniper Field Guide* in their *Sage Steppe Ecosystem Restoration Strategy Final Environmental Impact Statement (FEIS)*. Modoc National Forest managers participated in the Walker Butte field tour and emphasized the importance of using SageSTEP information in planning efforts.

Current funding for SageSTEP covers data collection 2 to 4 years following treatment depending on the year each site was treated. Managers and scientists agree that there is a need for more long-term monitoring of treated sites to increase understanding of long-term response. Resulting information will be especially useful for long-term planning on sagebrush steppe lands throughout the Great Basin.



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a meeting to further develop practical frameworks for managing
exotic invasive plants and wildfires.

Grand Sierra Resort, Reno, Nevada
December 9-11, 2008

<http://www.rangelands.org/deserts/>

Collaborative Project Highlight

Finding the Most Similar Landscape: Automated Control Site Selection Using GIS

Thomas Dilts, a research scientist at the University of Nevada-Reno (UNR), and Dr. Peter Weisberg, a professor at UNR, are conducting a collaborative study to test an automated control site selection methodology using Geographic Information Systems (GIS) software. The project does not involve collecting additional field data, but rather utilizes existing GIS layers to locate control sites that are similar to sites being treated as part of the SageSTEP study. This study is being conducted using information from the SageSTEP pinyon-juniper woodland study sites in Nevada (a map of treatment locations is available at <http://www.sagestep.org/locations.html>).

Criteria used to establish statistical similarity between SageSTEP sites and candidate sites identified through the automated spatial modeling approach include several topographic variables, metrics describing landscape structure, and pre-burn vegetation. Output GIS maps rank landscape units on the basis of similarity to the treated landscape unit. (continued on page 6)

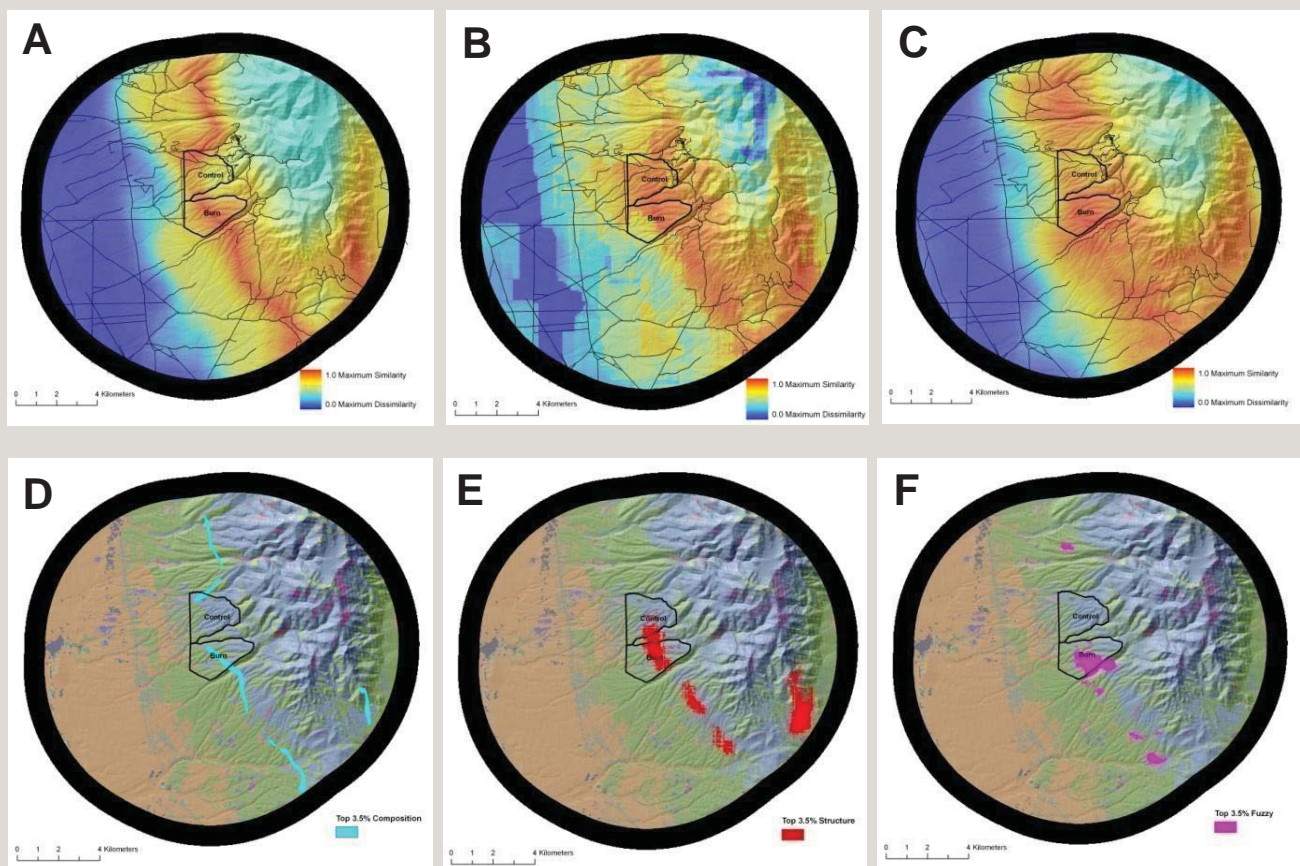


Figure 1: Maps showing similarity in vegetation at the South Ruby Mountain site. Similarity was assessed using different methods of varying complexity. A) Compositional similarity based on the cell counts only with no reference to the location of cells. B) Composite of configuration similarity using the spatially-implicit landscape metrics of mean patch area, perimeter-area ratio, and contagion. C) Configuration similarity using the spatially-explicit metric of cell agreement incorporating fuzziness in position. D) The top 3.5% most similar sites using the composition-only method. E) The top 3.5% most similar sites using spatially-explicit metrics of configuration. F) The top 3.5% most similar sites using spatially-explicit metrics of configuration that incorporate fuzziness in position. The burn treatment site is located in the center of the map, while the expert-selected control site is located just north adjacent to the burn site. The value of each cell represents the center point of an area the same size and dimensions as the burn site.

(continued from **page 5**)

Researchers chose to use SageSTEP to evaluate this concept because SageSTEP provides a good example of a real-world application for which finding suitable controls is vital, in that treatments cover large areas and replications are relatively few. In the future, the ability to produce this type of output could help managers and research scientists to identify suitable controls for treated study sites or landscapes by introducing an objective, transparent process for initially narrowing the search.

Additionally, Dr. Jian Yang, a UNR postdoctoral researcher, is working to develop Python scripts that can be run within ArcGIS to conduct this type of analysis. Although the GIS scripts are currently in development, the researchers expect that they will be completed within the upcoming months. After further testing and refinement the tools will be posted online for public download either on the Great Basin Landscape Ecology website (<http://www.cabnr.unr.edu/weisberg>) or on the ESRI Users ArcScripts website (<http://arcscripts.esri.com>). For more information about this study, contact Thomas Dilts at tdilts@unr.edu.

A collaborative project is a study outside of the core SageSTEP study that takes place on or in relation to one or more of the SageSTEP study plots. Each issue of SageSTEP News highlights a different collaborative project. More information about current collaborative projects and how to submit a proposal can be found at http://www.sagestep.org/collaborative_projects.html. We welcome proposals for non-invasive research on aspects of sagebrush ecosystems that are not covered in the SageSTEP proposal. If you are interested, please contact Jim McIver, SageSTEP Project Coordinator, at 541-562-5396 or james.mciver@oregonstate.edu.

SageSTEP DVD: *Restoring Sagebrush Rangelands in the Great Basin*

The SageSTEP Outreach Program will soon be distributing a DVD entitled *Restoring Sagebrush Rangelands in the Great Basin: An Introduction to Alternative Land Management Practices*. Funds to create the DVD were provided by Western Sustainable Agriculture Research and Education (SARE), and the primary audience of the disc is technical assistance professionals who work with owners of private grazing lands.

The DVD's feature track provides information about current threats to sagebrush rangelands in the Great Basin and potential land management treatments that can be implemented to encourage the restoration of healthier systems. The disc also includes bonus tracks with additional information about sagebrush restoration provided by scientists, private landowners, and public land managers. A booklet insert provides information about the disc contents and how to use them as well as information about the SageSTEP study.

The DVD's main feature can be viewed online at <http://www.sagestep.org/pubs/DVD.html>.

If you are interested in obtaining a copy of the DVD, send an e-mail to summer.c.olsen@usu.edu.



Upcoming Events

Society for Range Management Utah 2008 Fall/Winter Meeting

Provo, Utah

November 6-7, 2008

<http://www.rangelands.org/events.shtml#sectionevents>

Society of American Foresters 2008 National Convention: Forestry in a Climate of Change

Reno-Tahoe, Nevada

November 5-9, 2008

<http://www.safnet.org/natcon-08/>

Wildfires and Invasive Plants in American Deserts

Grand Sierra Resort, Reno, Nevada

December 9-11, 2008

<http://www.rangelands.org/deserts/>

Tall Timbers 24th Fire Ecology Conference Future of Prescribed Fire: Public Awareness, Health & Safety

Tallahassee, Florida

January 11-15, 2009

<http://www.talltimbers.org/FEconference/>

Society for Range Management 62nd Annual Meeting, Merging Trails: Culture, Science and Innovation

Albuquerque, New Mexico

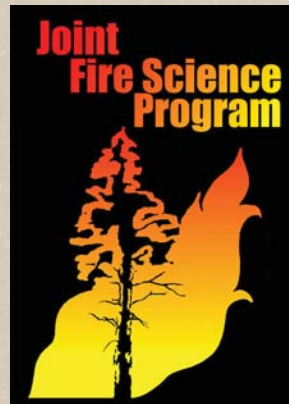
February 8-12, 2009

<http://www.srmmeetings.org>

SageSTEP is a collaborative effort among the following organizations:

- Brigham Young University
- Oregon State University
- University of Idaho
- University of Nevada, Reno
- Utah State University
- Bureau of Land Management
- Bureau of Reclamation
- USDA Forest Service
- USDA Agricultural Research Service
- US Geological Survey
- US Fish & Wildlife Service
- The Nature Conservancy

Funded by:



**For more information and
updates, visit our website:**

www.sagestep.org

Thanks to everyone who contributed to this issue of SageSTEP News: Mark Brunson, Thomas Dilts, Jim McIver, Rick Miller, Summer Olsen, Jaime Ratchford, and Peter Weisberg.