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SageSTEP News, Summer 2006, No. 1

SageSTEP

SageSTEP News

Sagebrush Steppe Treatment Evaluation Project

Issue 1, Summer 2006

A SageSTEP Forward

Welcome to the first edition of SageSTEP News! As many of you know, SageSTEP (Sagebrush Steppe Treatment Evaluation Project) is an interdisciplinary, long-term research program that will explore ways to improve the health of sagebrush rangelands across the Great Basin.

The purpose of SageSTEP is to conduct research and provide land managers and stakeholders with improved information to make decisions about restoring sagebrush rangelands that have been degraded by conifer encroachment or exotic grassland invasion. The research team is comprised of experts in a variety of disciplines from five universities and four resource management agencies in five states encompassing the Great Basin.

Land management treatment options, including prescribed fire, mechanical thinning of shrubs and trees, and herbicide applications will be evaluated to learn how to create healthy and diverse plant communities that will be more resilient to fire and resistant to weed invasion. Baseline data is being collected at most sites this summer and treatments will begin in the fall. Monitoring data will be collected in subsequent years to determine the impacts of each treatment.

As a fully interdisciplinary project, SageSTEP will also include research on economic and sociopolitical impacts of sagebrush steppe restoration. The economic research component of this project will feature an environmental valuation study. This

(continued on **page 2**)

Onaqui Sagebrush/Utah Juniper Site, Utah

In this issue:

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

For more information and updates, visit our website:

www.sagestep.org

Sagebrush Steppe SageSTEP Treatment Evaluation Project

(continued from **page 1**)

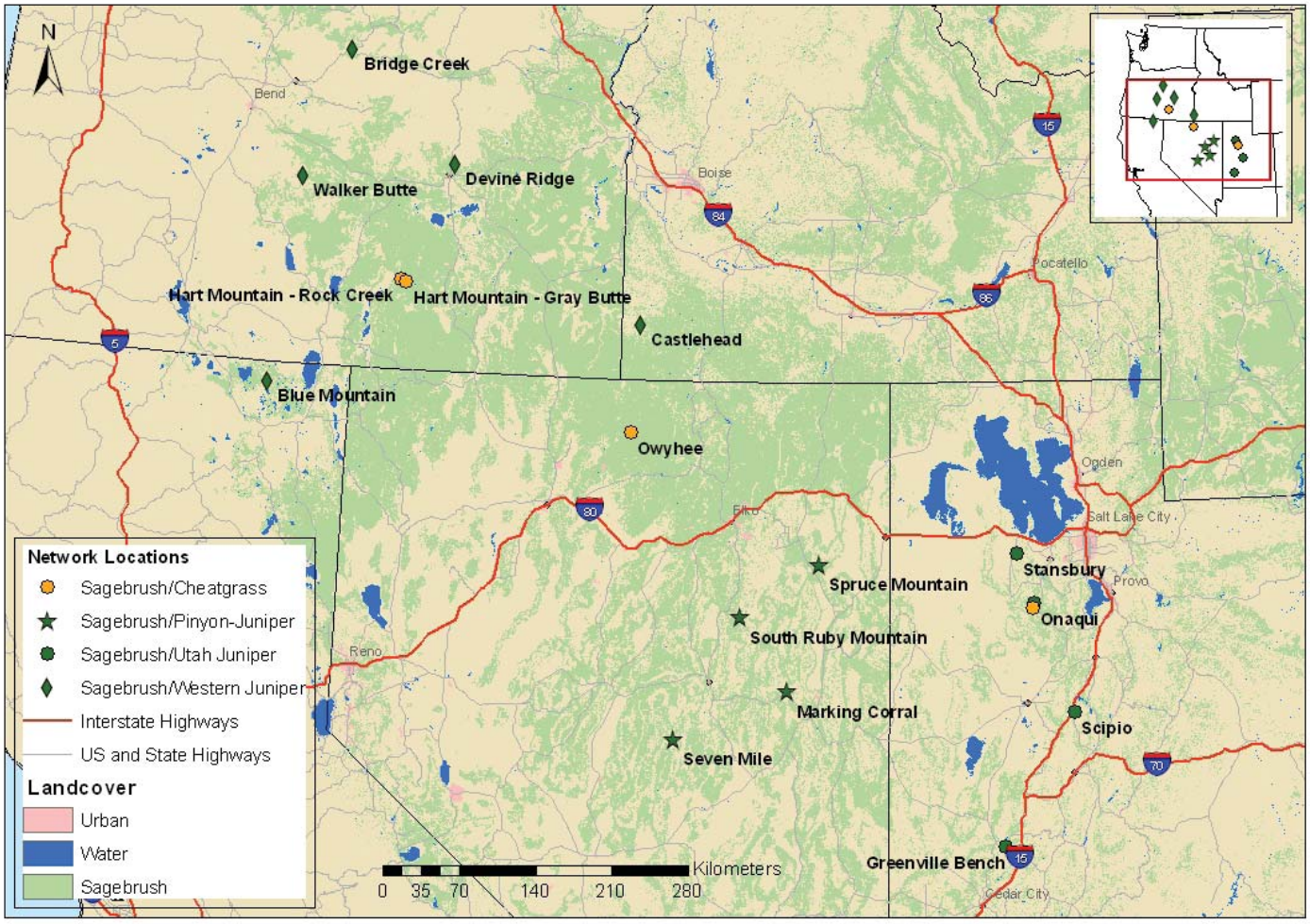
study will identify and measure changes in environmental benefits (such as recreation, ranching, cultural heritage, and reduced risk of property loss due to wildfire) resulting from ecosystem changes caused by the alternative land management treatments.

The sociopolitical portion of the project will focus on understanding the social acceptability of management practices as well as factors that influence managers' willingness to use them. Even when ecological research shows management activities to be good for the environment, public perceptions about those practices or resistance from managers can prevent their implementation. Public lands comprise most of the Great Basin, so understanding the perspectives of citizens and land managers is crucial to successful implementation of useful land management treatments.

We will be sending out our newsletter approximately three times a year with updates and information about the progress of the project. The SageSTEP research team is excited to undertake this project and we look forward to providing interested land managers and stakeholders with useful information for the future of sagebrush steppe ecosystems.

Hart Mountain Sagebrush/ Cheatgrass Site, Oregon

SageSTEP Network Map



Message From the Project Coordinator

For this inaugural issue of the SageSTEP newsletter, I have to say that I am delighted to be part of such an important research project, focused on the restoration of sagebrush steppe systems in the Great Basin. Thanks to generous funding from the Joint Fire Sciences Program (Department of Interior, US Forest Service), we have an opportunity to provide managers with better information on how to restore sagebrush steppe systems that have been or are currently being invaded by woodland vegetation in the higher elevations, and cheatgrass in the lower elevations. I am happy to report that we have a team of researchers that is dedicated to solving this problem, with the help of an energetic and knowledgeable cadre of land managers and interested stakeholders. With the SageSTEP project, this science-management team has bitten off a big piece of pie.

By just about every measure, whether it be geographic scale, the number and complexity of relationships with managers, or the number of variables to be measured, in SageSTEP we've taken on a big job. Yet progress is substantial. All woodland sites have now been selected, including four Utah juniper, four pinyon-juniper, five western juniper core sites, and three 1000-acre pairs of sites for wildlife. Half of our scheduled eight sage/cheat sites have now been selected, including two in the eastern portion of the Great Basin, and two in the west. Field teams for most sites are now busy collecting data, and plans are being laid for the first treatments to be applied late this summer or early fall. I believe that our relationships with managers, who are so important for this project, are way over on the positive side. Hopefully, our new User's Guides for the woodland systems, which are being field-tested this year, will prove to be excellent tools for managers faced with making difficult decisions on how to deal with woodland invasion of sagebrush communities in the Great Basin. I look forward to seeing this project through–-sagebrush steppe systems certainly need a shot in the arm.

-–Jim McIver, Ecologist, Oregon State University

Are you interested in conducting a study using one or more of our plots?

We welcome proposals for non-invasive research on aspects of sagebrush ecosystems that are not covered in the SageSTEP proposal (e.g., herpetology, bryology, mycology, etc.).

If you are interested, please contact
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Spruce Mountain Sagebrush/Pinyon-Juniper Site, Nevada

Setting the Stage: Baseline Data Collection, Summer 2006

In order to quantify changes resulting from alternative land management treatments that will take place in the fall, extensive baseline ecological data are now being collected at the majority of SageSTEP sites (see map on page 2). Data include information about fuels, vegetation, soils, hydrology, wildlife, insects, and climate. Each site has 3 to 4 core plots that are being sampled, one for each treatment that will take place at the site (control, prescribed burn, mechanical, and herbicide). These core plots vary in size from 8-81 hectares and contain 33 x 30 meter subplots where transects and quadrats are located. Following is a brief description of the different types of data that are being collected.

Fuels

Each sub-plot will be sampled for 10-, 100-, and 1000-hour fuels in the form of down woody debris; herbaceous fuel biomass in the form of litter, standing dead material and current year's growth; and shrub volume correlated with shrub biomass sampling.

Vegetation

Vegetation will be measured in each subplot in the form of cover by species, basal gap analysis of perennial plants, shrub density by height class, and herbaceous density by growth form.

Collecting data at a woodland site.

Collecting data at a woodland site.

Soils

Soil samples at each site include trowel samples of under- and inter-shrub soils for chemical analyses as well as soil profile descriptions. Researchers will measure total carbon and total nitrogen on each sample, including readily available nitrogen and other nutrients with various types of soil extractants. It is especially vital to obtain good data on available nitrogen, as many of the invasive species (such as cheatgrass) thrive on the high levels of available nitrogen typically present directly after burning.

Hydrology

Hydrologists will quantify the relationships between changes in vegetation and ground cover and hydrologic and erosion processes. They will focus on determining if there are critical thresholds in vegetation and ground cover that significantly influence hillslope hydrology and erosion and how management treatments may influence these thresholds. Thirty-two runoff plots will be samples in each prescribed burn and control plot at woodland sites. These small-plot rainfall simulations will be used to study infiltration, flow, and erosion.

Wildlife

Studies of wildlife response will determine if and how wildlife populations benefit from alternative land management treatments. Although greater sage-grouse are the most publicized species in sagebrush habitats and are present on or near each site, even the large treatments in this study are too small to study changes in their large home ranges (sometimes more than 2,500 km^2) and even a 5-year study is too short to detect population responses. Therefore, wildlife biologists are studying 4-6 species of smaller

(continued on **page 5**)

(**Setting the Stage**...continued from **page 5**)

passerine birds that also depend on sagebrush habitats to determine their response to the habitat treatments. These species have small home ranges, often less than 0.1 km^2, and rapid population responses. Data includes estimates of the numbers of birds that use each site, how successful they are in producing young, and how frequently individuals return to the same locations each year to nest. This information is collected by counting birds, capturing and banding individuals, and searching for nests. The results from this study will tell us how the bird community changes and what causes the change in response to habitat treatments.

Insects

Entomologists will collect data on butterflies and ants. First, they will conduct surveys of butterflies within all core plots across the Great Basin, to provide network-wide information on one aspect of faunal biodiversity. Butterflies were chosen to study for biodiversity within this study, because they have small enough home ranges that their populations can be measured within the core plots, changes in their abundance and diversity reflect what happens to their host plants (for which they tend to be fairly specific as caterpillars), and they are valued by the public. Second, entomologists will measure how ants respond to treatment, because of how important these organisms are to sagebrush steppe systems, particularly with respect to seed predation and dispersal.

Additional Data

Yearly standard photographs will be taken at each site, and each site will also have multiple soil moisture sensors, and a climate station.

Sites in California and Idaho will not be treated until fall of 2007, and the majority of baseline data for these sites will be collected in the summer of 2007. For more detailed information about baseline data collection, please contact the relevant discipline group leader. Names and contact information can be found on our website at www.sagestep.org/team_members.html.

Field technicians collect samples.

Sagebrush/Western Juniper Field Crew

Alternative Land Management Treatments, Fall 2006

Alternative land management treatments are scheduled to begin this fall. All SageSTEP sites are located on public lands (Bureau of Land Management and USDA Forest Service), and all treatments are taking place in cooperation with public land managers.

Sagebrush/Cheatgrass Treatments

Four sagebrush/bunchgrass sites varying spatially in perennial grass and cheatgrass cover will be treated for sagebrush control this fall. Two are at Hart Mountain, Oregon, one is in the southern Owyhee desert, Nevada, and one in Rush Valley, Utah (Onaqui). These sites will be subjected to different management techniques on a large scale, then monitored for at least five years to assess the threat of cheatgrass invasion and the possibility of recovery of the native community given different preexisting levels of perennial grass cover (density) in the sagebrush understory.

Each site consists of four treatment plots ranging from 75 to 200 acres. The four treatments are 1) mechanical (mowing), 2) prescribed burn, 3) herbicide application, 4) control (untreated). Mowed plots will be mowed at a height of 6-12 inches; the prescribed burn will blacken 100% of the treatment plots; and the herbicide Tebuthiuron (Spike 20P) will be applied at 1 to 1.5lbs/acre depending on the site. The goal of the mechanical and chemical treatments is to kill about 50% of the sagebrush, not eliminate it. Furthermore, a Plateau pre-emergence herbicide treatment will be crossed at the subplot level with the four main treatments to achieve cheatgrass control. Of the 24 subplots at each site, 12 will be treated with Plateau and 12 without.

Sagebrush/Woodland Treatments

There are thirteen sagebrush/woodland sites that will be treated in fall 2006 and 2007. Four of these are sagebrush/Utah juniper sites located in western Utah, some of which also include 2-needle pinyon. Four are sagebrush/pinyon-juniper sites found throughout Nevada. Five are sagebrush/western juniper sites--three in southeastern Oregon, one in southwestern Idaho, and one in northeastern California.

Treatments on woodland sites will occur at two different scales. Three treatments will be applied across 6 to 50 acre plots at each site: 1) mechanical, 2) prescribed burn, 3) control (untreated). The mechanical treatment will involve clearcutting all trees down to 1/2 meter in height and leaving them on the contour. Thinning will also occur in a buffer zone around each mechanical core plot. As with the cheatgrass treatments, prescribed burns will blacken 100% of the woodland core plots.

Some sites will also include a 1000 acre burn plot with a paired 1000 acre control plot to better accomodate the study of hydrology and wildlife. Prescribed burns will blacken 50 to 70% of these extensive plots. No treatments will occur in the control plots for the duration of the project.

A fourth treatment, Bull Hogging™, will be applied at the Utah woodland sites. This treatment is taking place because it has been of local interest to Utah landowners. The Bull Hog™ has been used extensively in Utah to thin or clear all trees. The main goal of Bull Hogging™ is fuel reduction to reduce fire hazards; other goals include improved understory plant growth and wildlife habitat.

We would like to say

Thank You

to all of the public land managers who are working with us to implement these management treatments.

Introducing the Sage Team...

Because SageSTEP is a multidisciplinary and integrative project, the researchers comprising the "Sage Team" is very diverse. The team includes scientists from a wide variety of disciplines who bring expertise gained from years of experience. For more on the research interests and contact information for any of these individuals, visit the team members page on our website (www.sagestep.org/team_members.html).

Project Coordination
Jim McIver, Ecologist and SageSTEP Project Coordinator, Oregon State University
Karen Erickson, Faculty Research Assistant, Oregon State University

Sagebrush-Cheatgrass Researchers and Site Managers:
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Gene Schupp, Plant Ecologist, Utah State University
David Pyke, Plant Ecologist, U.S. Geological Survey
Scott Shaff, Ecologist, U.S. Geological Survey
Jeff Burnham, Research Associate, Utah State University

Sagebrush-Woodland Researchers and Site Managers:
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Robin Tausch, Supervisory Range Scientist/Plant Ecologist, USDA Forest Service
Jeanne Chambers, Plant Ecologist, USDA Forest Service
Bruce Roundy, Plant Ecologist, Brigham Young University
Brad Jessop, Research Associate, Brigham Young University
Jaime Ratchford, Research Assistant, Oregon State University
Travis Miller, Research Associate, USDA Forest Service

Discipline Group Leaders and Associates
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Soils: Dale Johnson, Soil Scientist, University of Nevada, Reno
Benjamin Rau, Research Assistant, University of Nevada, Reno

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Patrick Kormos, Hydrologic Technician, USDA Agricultural Research Service

Wildlife: Mike Wisdom, Wildlife Biologist, USDA Forest Service
Steve Knick, Research Ecologist, U.S. Geological Survey
Matthias Leu, Ecologist, U.S. Geological Survey

Entomology: Jim McIver, Ecologist, Oregon State University

Socio-political: Mark Brunson, Social Scientist, Utah State University
Bruce Shindler, Social Scientist, Oregon State University

Economics: Kim Rollins, Economist, University of Nevada, Reno
John Tanaka, Economist, Oregon State University
Neil Rimbey, Extension Range Economist, University of Idaho
Tom Harris, Economist, University of Nevada, Reno

Statistics: David Turner, Mathematical Statistician, USDA Forest Service

Management Representation: Nora Devoe, Science Coordinator, Bureau of Land Management
Mike Pellant, Great Basin Restoration Initiative Coordinator/Rangeland Ecologist, Bureau of Land Management

Database: Mark Lewis, Database Manager, USDA Forest Service

Outreach: Summer Olsen, Outreach Program Coordinator, Utah State University

What Makes SageSTEP Unique?

We're not the first scientists to tackle the problems of cheatgrass invasion, pinyon-juniper encroachment, or loss of sagebrush plant communities and wildlife habitats. So one concern we've heard expressed several times over the past year is, "Do we really need yet another sagebrush study?" It's a reasonable question to ask, so we'd like to take this opportunity to try to answer it.

The most obvious difference between SageSTEP and other sagebrush restoration studies is the sheer scale of our project. Our objective is to identify principles and practices that can be applied throughout the Great Basin. We're setting up study sites in five different states and are assessing a very wide range of treatment effects. Most prior or ongoing studies have focused more narrowly on specific site or environmental conditions, or on particular components of sagebrush ecosystems. While such studies will continue to be extremely valuable because of their utility for solving specific management problems, we hope to provide more generalizable information that can be applied even in situations where no more local or problem-centered data exist, and that can guide ecological theory about Great Basin systems.

The regional scale of our research also has dictated the types of experimental treatments we will apply. For scientific reasons we must use the same methods across the entire study region. That means choosing treatments, variables and measurement protocols that are appropriate in a wide variety of sites. For example, in juniper and pinyon stands we will clearcut and leave the felled trees on site because that is the only feasible mechanical treatment for conifers that can be used throughout the region; however, because wood shredding machines are commonly used in the eastern Great Basin we've added a Bull Hog™ treatment at the request of managers in Utah.

This is also why we haven't included a livestock treatment. We know there's great interest in the potential for intensive livestock grazing to reduce shrub cover and rejuvenate decadent sagebrush stands. However, good grazing management requires attention to local climatic and vegetation conditions, so there is no single grazing treatment that we could apply identically in California, Utah, Idaho, Nevada and Oregon.

Another difference between SageSTEP and other projects is the sheer breadth of effects we will be able to assess. We have hydrologists, wildlife biologists, fire ecologists, soil scientists, sociologists, economists, and various types of plant population and community ecologists – all looking at the effects of the same treatments in the same places. To extend our efforts even further, we're also inviting proposals for non-invasive research on other aspects of sagebrush ecosystems (e.g., herpetology, bryology, mycology, etc.).

Because of the scope of our project, we're focusing on the general problem of restoring sagebrush-steppe ecosystems rather than on addressing specific problems related to land and wildlife management. That has surprised some people – for example, they note that we don't have a protocol for studying treatment effects on sage grouse, pygmy rabbits, mule deer, or other wildlife species of particular concern. That's not an oversight, nor do we mean to ignore important issues facing managers of Great Basin sagebrush habitats. But since our study design is intensive rather than extensive – i.e., we're looking in great detail at relatively small plots (200 acres or less, in most cases) strategically located across the region – we can't measure effects on animals with large home ranges. For that reason, our wildlife work focuses on species with smaller home ranges such as songbirds.

Still, we're sure that our work will fit nicely with that of other highly qualified scientists who are already studying effects of habitat manipulations on wildlife, and we expect that our broad, system-wide focus will help us learn things that can be useful for managing species of special concern. For example, our entomological studies will help us learn how different restoration treatments affect insect prey populations needed by sage grouse chicks and hens.

Overall, we are confident that through careful quantitative monitoring of variables that are important to managers, SageSTEP research will improve our understanding of a wide range of ecosystem components and yield directly usable knowledge that can be applied by managers throughout the Great Basin.

Field tour at Onaqui site with Utah Partners for Conservation and Development, April 2006.

SageSTEP is a collaborative effort among the following agencies and universities:

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

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