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Sagebrush Steppe Treatment Evaluation Project (SageSTEP): Restoration Research with Practical Applications

By Summer Olsen

Sagebrush rangelands cover millions of acres in the Great Basin including parts of Oregon, California, Idaho, Nevada, and Utah. This land provides a variety of important services, including wildlife habitat, clean water, recreation, and economic opportunities; it also serves as the primary forage base for the western livestock industry. Healthy sagebrush rangelands are rapidly being lost due to a variety of factors including severe wildfires, woodland expansion, invasion of non-native species, urban development, and drought. This loss can have significant impacts on those who depend on the land for goods and services.

Sagebrush Steppe Treatment Evaluation Project, known as SageSTEP, is an interdisciplinary, five-year research program that is exploring ways to improve the health of sagebrush rangelands across the Great Basin. The project is funded by the federal government's Joint Fire Science Program (JFSP) and is a collaborative effort among five universities, six federal agencies, and one non-governmental organization. This study seeks to address the rapid loss of healthy sagebrush rangelands in the Great Basin due to invasion of cheatgrass (a highly flammable non-native weed), severe wildfires, and expansion of pinyon and juniper woodlands.

The purpose of SageSTEP is to conduct research that will provide land managers with improved information to make decisions about restoring sagebrush rangelands. More than 25 scientists are working in collaboration with land managers in more than 20 different offices throughout the Great Basin to implement the project. SageSTEP is a unique study that will produce new scientific findings about sagebrush steppe ecosystems as well as practical information about restoration that can be applied by managers.

SageSTEP consists of two experiments that are being conducted across a regional network of sites in sagebrush communities, one looking at sagebrush sites in various stages of cheatgrass invasion and one in sagebrush sites facing pinyon and juniper woodland encroachment. The project has 20 study sites scattered throughout the five Great Basin states, primarily on public lands. This regional network will allow scientists to understand the thresholds between healthy and unhealthy sagebrush communities over a broad range of conditions across the Great Basin.

Land management treatment options are being studied to learn how healthy and diverse plant communities can be created that will be more resilient to fire and resistant to weed invasion. Treatments at sagebrush sites invaded by cheatgrass include prescribed burning, mechanical thinning of sagebrush using a mower, and application of the herbicide tebuthiuron to thin sagebrush. Imazapic pre-emergent herbicide is being applied in half of the subplots of each treatment at sagebrush sites to assess its ability to prevent the growth of cheatgrass. At woodland sites, treatments include prescribed burning, mechanical removal of trees by chainsaw, and tree mastication using a Bull Hog™ (in Utah only). Each site also has a control plot where data are being collected but no treatment is taking place. To date treatments have been implemented at 13 of the 20 study sites, and are planned for the remaining sites this fall (2008).

Collection of baseline ecological data began in summer 2006, and data collection continued in 2007 at both treated and untreated sites. Although official data analyses have not yet begun, scientists are beginning to make preliminary observations based on what they are seeing at treated sites after one growing season, and the results are encouraging.

The following ecological data is being collected:

Vegetation and Fuels: 10-, 100-, and 1000-hour fuel samples, and various other vegetation and fuel measurements are being collected in both the understory and overstory. Non-fuel vegetation measurements will allow scientists to learn more about the types of plant communities that are likely to appear after a wildfire or management action.

Soils: Soils are being sampled for chemical analyses and soil profile descriptions. This information will tell scientists more about the effects of treatments on the availability of essential plant nutrients.

Hydrology: Rainfall simulations are being conducted on small (0.5m²) and large (35m²) plots, and measurements are being taken to help scientists better understand relationships between changes in vegetation and ground cover and runoff and erosion.

Wildlife: Wildlife data collection focuses on the effects of treatments on migratory songbirds.

Insects: Butterflies are being surveyed for biodiversity, and ants are being studied because of their importance to sagebrush steppe systems, particularly for seed dispersal and predation.

Soil Moisture and Temperature Stations: Microloggers collect soil moisture and temperature data continuously at most sites.

SageSTEP is an interdisciplinary study and includes economic and social components. SageSTEP economists are studying the economic impacts of restoration activities. Economic studies include modeling impacts at ranch and regional levels, and non-market valuations of ecosystem goods and services. Social scientists are looking at public and managers' acceptance of restoration activities as well as special interest group concerns that may affect the willingness or ability of individuals and agencies to implement restoration projects.

Results of all aspects of the SageSTEP research will provide resource managers with improved information to make restoration management and wildfire risk-reduction decisions with reduced risk and uncertainty.

About the Author

Summer Olsen works as SageSTEP's Outreach Program Coordinator. She develops materials and methods to deliver project information and results to land managers and other interested stakeholders. This is Contribution Number 13 of the Sagebrush Steppe Treatment Evaluation Project (SageSTEP), funded by the U.S. Joint Fire Science Program.

