Project Status Report: August--November, 2009.

Project Title: Anthro Mountain CSI project (WRI #1533)
Greater Sage-Grouse Habitat Restoration - Phase II: Restoration of Sagebrush-Steppe Habitats Encroached by Pinyon-Juniper

Executive Summary

Greater sage-grouse (hereafter sage-grouse) numbers and distribution have been declining in Utah and other western states. In some cases these declines have been associated with loss and degradation of seasonal habitats. On Anthro Mountain in northeastern Utah, sage-grouse seasonal habitats are being impacted by the encroachment of pinyon-juniper. This project was conducted to restore sage-grouse winter and transitional sagebrush steppe habitat. The area selected for this project was chained in the 1960s. Since then no other mechanical treatments have been conducted. Concomitantly, the encroachment of pinyon and juniper trees has impacted the quality and ability of the sagebrush steppe habitat to support wildlife needs. The sage grouse population in this area is small and poor habitat conditions have been identified as major threat contributing to the current situation. This project will specifically benefit sage grouse, which are a Tier II species as described in the Utah Wildlife Action Plan (WAP). Also benefiting is the shrubsteppe habitat, a key habitat for species of concern as described in the WAP. The project is also compatible with the Ashley National Forest Plan, which identifies sage-grouse as a Forest Service sensitive species and an Ashley National Forest Management Indicator Species. The project is also consistent with recommendations from the Uintah Basin Adaptive Resources Management Sage-grouse Local Working Group (UBARM). To complete this project, a private contractor was hired to cut (lop and scatter) 1573 acres encroached by pinyon and juniper trees. This project will evaluate the effects of pinyon-juniper removal to restore seasonal sage-grouse sagebrush-steppe habitat.

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Project Coordinator: Chris Peterson, Utah State University

Introduction

Greater sage-grouse (*Centrocercus urophasianus*: hereafter sage-grouse) are a sagebrush (*Artemisia spp.)* obligate species (Wirth and Pyke 2003, Schroeder et al. 2004). As such, they require mosaics of sagebrush habitats to complete their life cycle (Braun et al. 1977, Connelly et al. 2000). The Utah Division of Wildlife Resources (UDWR) estimates that both numbers and distribution of sage-grouse in Utah have decreased to less than 50% of historic levels (UDWR 2002). Similar declines have occurred throughout the western United States and western Canada prompting petitions to list the species under the Endangered Species Act of 1973 (USFWS, http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=B06W).

Sage-grouse population declines are generally attributed to the reduction and fragmentation of sagebrush habitats. Large decreases in sage-grouse numbers have been related to small changes in quality and availability of suitable winter habitat (Beck 1977, Swenson et al 1987).

Pinyon-Juniper Encroachment

Pinyon pine (*Pinus edulis*) and Juniper (*Juniperus spp.*) woodlands account for over 18 million ha (44,600,000 acres) of cold desert in the Intermountain West (Miller and Tausch 2001). In many areas, these woodlands are associated with sagebrush-steppe (*Artemisia* spp.) habitat. Over the past century pinyon-pine and juniper woodlands (hereafter PJ), have encroached into historic sagebrush-steppe ecosystems, resulting in a loss of habitat functions. This increase in PJ woodlands is generally attributed to fire suppression, introduction of domestic livestock grazing, and climate shifts (Tausch, R. J. 1999, Miller and Rose 2000). Increased PJ woodland can have a pronounced impact on plant community structure and composition, understory production, and wildlife habitat, and alters ecosystem processes (Miller and Tausch 2001). In the Great Basin, Everett (1987) noted that as PJ crown cover increased, cover, productivity, and density of understory species decreased. In the absence of disturbance or management, the majority of these landscapes will become closed woodlands resulting in the loss of understory plant species and greater costs for restoration.

Sage-grouse Winter Habitat and Restoration

Generally, wintering sage-grouse (December-March) use areas that include windswept ridges, south to southwest slopes, sagebrush canopy cover of 15-20 %, and areas with live sagebrush height that exceeds height of snow cover by 25-35 cm (Braun et al. 2005). Sage-grouse avoid coniferous habitat (Connelly et al. 2000, Doherty et al. 2008).

To restore sage-grouse habitat by removing encroaching PJ, land management agencies typically use both natural and mechanical treatments. Prescribed burning and chaining in combination with use of a harrow or aerator have been used to remove PJ overstory and major portions of the understory. A mechanical cutting technique, referred to as “lop and scatter” removes the PJ overstory without removing sagebrush and other understory species.

In central New Mexico, mechanical reduction of PJ overstory with chainsaws resulted in a significant increase in understory cover, including grass, forb, and shrub species (Brockway et al. 2002). However, the response of understory to PJ removal may be related to the density of PJ crown cover (Huber et al. 1999). With PJ crown cover greater than 20-25%, response of understory to PJ removal may be reduced.

Project Objective

The purpose of this project was to evaluate the ecological viability of using "lop and scatter" methods to remove encroaching PJ trees to manage sage-grouse winter habitat. Specifically we were interested in evaluating changes in vegetation composition of sagebrush-steppe habitat, in particular forb and grass understory, in response to removal of dense PJ cover.

Study Site

The Anthro Mountain study area is in the U.S. Forest Service (USFS) Ashley National Forest in northeastern Utah. Elevations range from 2500 - 2900 meters. Historically the area was used for livestock grazing. The study plots included sites previously chained in the 1960's and that were experiencing PJ encroachment (Fig. 1). As a result, the sagebrush habitat in the project area is not in a state that adequately supports wildlife needs. The sage-grouse population in the area is small. Poor habitat condition has been identified as a major factor contributing to local population declines.

Wyoming big sagebrush (*A. tridentata Nutt. ssp. wyomingensis*) is the dominant sagebrush species in the study site. Black sagebrush (*A. nova*) also occurs in the area. Other shrub species include snowberry (*Symphoricarpos occidentalis*), serviceberry (*Amelanchier* spp.), mountain mahogany (*Cercocarpus ledifolius* Nutt.), and rabbitbrush (*Chrysothamnus viscidiflorus*). The understory is comprised of an array of native forbs including vetches (*Astragulus spp*.), penstemons (*Penstemon spp*.), and prickly pear (*Opuntia spp*.), and grasses including bluebunch wheatgrass (*Pseudoroegneria spicata*).

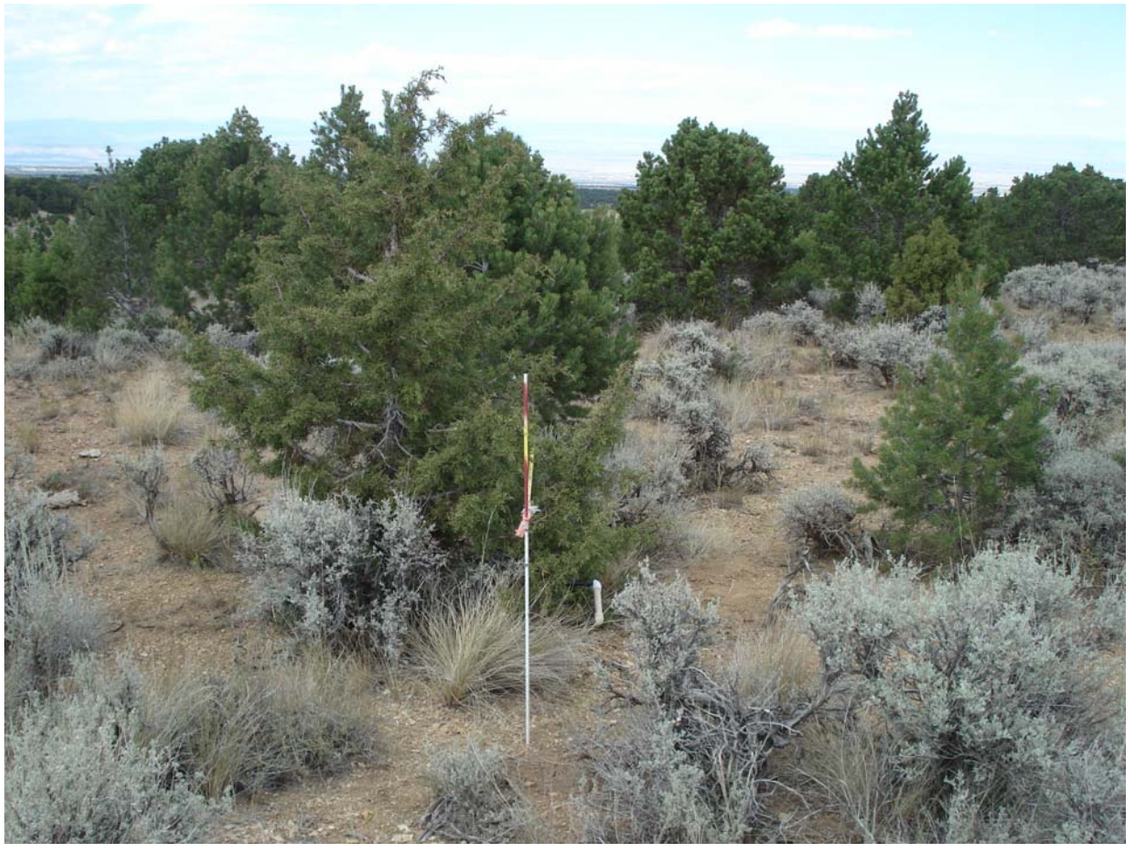

Fig. 1. Pinyon-juniper encroachment in sagebrush-steppe habitat in the Anthro Mountain Study Area, Ashley National Forest, Utah, 2009 (Photos by C. Peterson).

Methods

Vegetation Monitoring **-** To conduct the project, we identified 1573 acres of sagebrush-steppe habitat on Anthro Mountain experiencing encroachment of PJ. In late-August, 2009, within this 1573 acres, we identified 4-10 acre paired-plots (1 paired-plot = 1 treatment plot and 1 control plot) locations on similar ecological sites. Individual plots were randomly assigned to the treatments of lop and scatter, or control. Plot corner coordinates were downloaded into a GPS unit and mapped in ArcView; corners and edges were flagged. Three 30-m vegetation transects were randomly located and marked with 4’ fiberglass fence stakes in each treatment and control plot (Fig. 2).

Fig. 2. To establish a transect, a 30m (100') tape is stretched between end stakes. Endpoints are demarcated with permanently placed 4' fiberglass fence posts, marked with paint and flagging. Vegetation is measured at predetermined intervals along each transect for characteristics such as forb or shrub cover, and species composition, Anthro Mountain Study Area, Ashley National Forest, Utah, 2009.

Understory vegetation was measured to determine species composition and foliar cover using a point-intercept method (every 20 cm), shrub cover with line-intercept, and forb-grass cover with Daubenmire frames every 3 m (Fig. 3; Daubenmire 1959). Pre- and post-treatment photos were taken from transect endpoints. Vegetation will be monitored through 2012.

In early September immediately prior to the lop and scatter treatment, we recorded vegetation species composition and percent cover on permanent transects established on both treatment and control plots (24 transects total). Five days preceding the treatment, we measured tree stem density on all plots. To measure tree density, a 70' diameter circle was centered on the mid point of each transect in both treatment and control plots. All trees within this circle were counted, and diameter at 12" above ground was estimated. Tree stem density across plots ranged from > 300 to 600 trees/acre.

Fig. 3. Daubenmire frames provide units of reference for estimating the percentage of cover within the frame area provided by each plant species, as well as bare ground, litter, and rock, Anthro Mountain Study Area, Ashley National Forest, Utah, 2009.

Lop and Scatter – From mid-late September, 2009, contract crews used chainsaws to remove encroaching PJ from the 1573 acres of the study site (Fig. 4). The 'lop' constituted crews walking across the site and using chainsaws to remove all PJ. The 'scatter' was the slash that was left where it fell.

Fig. 4. Foreground is a lower density treatment plot immediately following the application of the lop and scatter method. Standing trees in the background are in a control plot, Anthro Mountain Study Area, Ashley National Forest, Utah, 2009.

The contractors however, did not remove many of many smaller trees (<3’ dia) trees. In the denser study plots the “scatter” resulted in the accumulation of dense deadfall on the vegetation transects. Because our study objectives included measuring vegetation response to the removal of overstory competition, we removed all remaining small trees from our study plots and the deadfall slash from transects. To do this, we used pruning loppers and chainsaws, and hand-removed all slash from a 10’ zone on all sides of each transect (Fig. 5).

This follow-up removal required an additional 4 trips from Logan to the study site, and 71 additional hours (volunteers 32 hours, staff 32 hours, Ashley National Forest Fire Crew 7 hours). On average an additional 30 small (<3’) trees were cut from each transect. Every effort was made to not create large slash piles surrounding transects, as these might result in increased snow drifts on transects.

The contractor bill for PJ lop and scatter, excluding clean up work conducted by the project coordinator, volunteers, and fire crew totaled $43,659.84.

Fig. 5. The project coordinator, volunteers, and a U.S. Forest Service fire crew removing pinyon-pine trees felled during the lop and scatter from vegetation transects, Anthro Mountain Study Area, Ashley National Forest, Utah 2009.

Future Plans

Vegetation monitoring using the methodology described above will be conducted through 2012.

Photos

Extra photos depicting conditions pre- and post- treatment are included immediately following the Literature Cited section.

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Additional Photos

Removal of slash and uncut trees from transects was time consuming and difficult, Anthro Mountain Study Area, Ashley National Forest, Utah 2009.

Although tree density varied across the study plots, sagebrush, forbs, and grasses were evident within a few feet of every transect, Anthro Mountain Study Area, Ashley National Forest, Utah 2009.

The densest plots contained over 600 trees per acre, with many older trees exhibiting multi-branched trunks with diameters in excess of 20 inches, Anthro Mountain Study Area, Ashley National Forest, Utah 2009.