Project Status Report: August--November, 2009.

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

Executive Summary

Greater 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 winter habitat. On Anthro Mountain in northeastern Utah, some of this habitat loss is thought to be related to encroachment of pinyon-juniper. The project area is in the site of a chaining that was done in the 1960s on Anthro Mountain and is experiencing significant encroachment of pinyon and juniper trees. As a result, the sagebrush habitat in the project area is not in a state that adequately supports wildlife needs. In addition, the sagebrush is in a state less than the desired condition because of conifer encroachment and poor sagebrush structure. The sage grouse population in this area is small and poor habitat condition has been identified as asignificant contributor to the current situation. The habitat work needs to be completed soon to help improve the habitat and provide better conditions for the sage grouse populations.

This project will benefit sage grouse, which are a Tier II species as described in the WAP. Also benefiting is the shrubsteppe habitat, a key habitat for species of concern as described in the WAP. The project is also compatible to with the Ashley National Forest Plan, which lists 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 UBARM sage grouse local working group.

Proposed Methods: A contract lop and scatter crew will be hired to remove encroaching pinyon and juniper trees from 400 acres of shrubsteppe habitat. 100 acres of this treatment will be involved in a research study to test the effectiveness of this method of habitat manipulation. The study will use 4 paired (treatment/control) plots of 50 acres each (25 treated/25 control). In addition, four 10-acre paired plots will be temporarily fenced to allow study of livestock grazing with supplemental feeding as a method of shrubsteppe habitat manipulation. This project will evaluate the effects of pinyon-juniper removal to restore sage-grouse habitat, on species composition and cover of the sagebrush and grass-forb understory.

Monitoring will be completed by Utah State University-Uinta Basin.
Monitoring
Information:
Monitoring will be completed by Utah State Universtity-Uinta Basin. Dr. Brent Bibles is lead on the monitoring portion of the project.
Monitoring will be completed with funding provided by a Cooperative Sagebrush Initiative grant.
Both vegetative and animal response will
be monitored both pre- and post- project. Pre-project monitoring will be started this summer and will be completed prior to vegetation
manipulation.
Vegetation Monitoring Wildlife Monitoring
Objectives: Utilize different methods of habitat manipulation. Test the effectiveness of these methods to reach desired conditions. Improve
sagebrush habitat for greater sage grouse. Monitor vegetative response to the treatments. Monitor animal response to the treatments.
County: Duchesne
SPECIES BENEFITING
Project Manager: Bob Christensen
Grazing
Management:
The grazing permitee is in favor of the project and will use his livestock on the grazing portion of the research project. Since no seed is
being used, the area will not need to be rested following treatment except as outlined for the study plots, which will be fenced temporarily.
Greater Sage-grouse Elk Shrubsteppe Birds Domestic Livestock
Wednesday, February 25, 2009 8:38:14
Project Proposal
Project Map:
LAND OWNERSHIP
PROPOSED FUNDING

PROPOSED BUDGET
Item Description DWR Account Partner Contrib.
Contractual Services Lop and scatter contract @ $30/acre $12,000.00 $0.00
Materials and Supplies temporary fencing for research plots @ $1.25/ft $4,175.00 $0.00
Contractual Services installation of temporary fencing @ $1.25/ft. $4,175.00 $0.00
Other supplemental feed for grazing study $9,000.00 $0.00
Totals *$29,350.00 $0.00*
Source
Amount
Requested
Date
Approved
Amount
Approved
DNR Watershed (FY10) $29,350.00 $0.00
Totals *$29,350.00 $0.00*
Owner Acres
USFS 500
Total 500
Wednesday, February 25, 2009 8:38:15

Greater Sage-Grouse Habitat Restoration: Lop And Scatter Removal Of Pinyon-Juniper Encroachment

Principle Investigator: Terry A. Messmer, Utah State University
Project Coordinator: Chris Peterson, Utah State University

Greater sage-grouse (*Centrocercus urophasianus*) are a sagebrush (*Artemisia spp.)* obligate species (Wirth and Pyke 2003, Schroeder et al. 2004). Sage-grouse require several types of sagebrush habitat throughout 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. These declines have led to multiple petitions for the specie's protection under the Endangered Species Act of 1973 (USFWS, http://ecos.fws.gov/speciesProfile/SpeciesReport.do?spcode=B06W). These 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 numbers (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 (*Artemisia spp.*) habitat. Over the past century many pinyon and juniper woodlands (hereafter PJ), have encroached into historic sagebrush habitat, resulting in a loss of shrub-steppe habitat. 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 has 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, chaining, or use of a harrow or aerator result in removal of both the PJ overstory and major portions of the understory. 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 the lop and scatter method to remove encroaching PJ trees to manage sage-grouse winter habitat on Anthro Mountain, in north eastern Utah. Specifically we were interested in evaluating changes in sagebrush, and the forb and grass understory due to removal of direct competition by PJ overstory.

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 were in the site of a chaining performed in the 1900s that is experiencing significant encroachment of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees (Figure 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 significant contributor to the current situation. Wyoming big sagebrush (*Artemisia tridentata Nutt. ssp. wyomingensis* Beetle & Young) is the dominant sagebrush specie in the study site, with black sagebrush (*Artemisia nova*) also 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*).

Figure 1. Pinyon-juniper encroachment in sagebrush habitat in the study area, with a transect stake in the foreground. All photos courtesy of Chris Peterson.

Methods

On Anthro Mountain, we identified 1533 acres of sagebrush habitat experiencing encroachment of PJ. In late-August, 2009, we identified 4 paired-plot (1 paired-plot = 1 treatment plot and 1 control plot) locations on similar ecological sites. Each plot was approximately 10 acres. 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 (Figure 2).

Figure 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.

Understory vegetation was evaluated for species composition, foliar cover with the point intercept method (every 20 cm), shrub cover with line-intercept, and forb-grass cover with Daubenmire frames every 3 m (Figure 3; Daubenmire 1959). Pre- and post-treatment photos were taken from transect endpoints. Vegetation will be monitored through 2011.

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.

Figure 3. Daubenmire frames provide units of reference for estimating the percentage of cover within the frame area provided by each specie of grass and forb, as well as bare ground, litter, and rock.

Lop and scatter was applied on all 1533 acres (except for the 40 acres of control plots) of the study site by contract crews (Figure 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.

Figure 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.

Results

In early September immediately prior to initiation of the lop and scatter treatment, we evaluated all transects on both treatment and control plots (24 transects total) for species composition, foliar cover, shrub cover, and forb-grass cover.

Five days preceding treatment, we measured tree density on all plots.

From mid-late September, 2009, contract crews used chainsaws to remove encroaching PJ from the 1533 acres of the study site. However, the treatment did not result in removal of many small (<3') trees, and did result in accumulation of thick, heavy, tree debris covering all transects. As our objectives included measuring the result of removal of overstory competition with understory, but not addition of huge amounts of mulch (slash), we then removed all remaining trees and 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 (Figures 5, 6). Thus, transects are centered lengthwise in a 120' by 20' PJ and slash free area.

This follow-up removal required an additional 4 trips from Logan to the study site, and 71 additional hours (volunteers 32 hours, staff 40 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 total expense for PJ removal was $43,659.84.

Figure 5. Removal of slash from transects.

Figure 6. Slash was piled high on transects and required many hours of hand removal.

Still to come

Vegetation monitoring will continue through 2011.

Photos

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

References

Beck, T. D. I. 1977. Sage Grouse flock characteristics and habitat selection in winter. Journal of Wildlife Management 41:18-26.

Braun, C. E., T. Britt, and R. O. Wallestad. 1977. Guidelines for maintenance of sage-grouse habitats. Wildlife Society Bulletin 5:99-106.

Braun, C. E., J. W. Connelly, and M. A. Schroeder. 2005. Seasonal habitat requirements for sage-grouse: spring, summer, fall, and winter. Pages 38-42 *in* Shaw, Nancy L., M. Pellant, S B. Monsen, comps. Sage-grouse habitat restoration symposium proceedings, June 4-7, 2001, Boise, Idaho. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Proc. RMRS-P-38. Fort Collins, Colorado, USA.

Brockway, D. G., R. G. Gatewood, and R. B. Paris. 2002. Restoring grassland savannas from degraded pinyon-juniper woodlands: effects of mechanical overstory reduction and slash treatment alternatives. Journal of Environmental Management 64:179-197.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines to manage sage-grouse populations and their habitats. Wildlife Society Bulletin 28:967-985.

Daubenmire, R. F. 1959. A canopy coverage method of vegetational analysis. Northwest Science 33:43-64.

Doherty, K. E., D. E. Naugle, and B. L. Walker. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management 72: 187-195.

Everett, R. L. 1987. Plant response to fire in the pinyon-juniper zone. In: Everett, R. L., comp. Proceedings—pinyon-juniper conference; 1986 January 13-16; Reno, NV. Gen. Tech. Rep. INT-215. Ogden, UT: US Depat. Of Agriculture, Forest Service, Intermountain Research Station: 152-157.

Huber, A., S. Goodrich, and K. Anderson. 1999. Diversity with successional status in the pinyon-juniper/mountain mahogany/ bluebunch wheatgrass community type near Dutch John, Utah. US Department of Agriculture, Forest Service, Rocky Mountain Research Station Proceedings RMRS-P-9, June, 1999.

Miller, R. F., T. J. Svejcar, and J. R. Rose. 2000. Impacts of western juniper on plant community composition and structure. Journal of Range Management 53:574-585.

Miller, R. F., Tausch, R. J. 2001. The role of fire in pinyon and juniper woodlands: a descriptive analysis. *In*: Galley, K. E. M., Wilson, T. P. editors. Invasive Species: the Role of Fire in the Control and Spread of Invasive Species symposium. Miscellaneous Publication No. 11, Tall Timbers Research Station, Tallahassee, Florida. 15-30.

Miller, R. F., R. J. Tausch, E. D. McArthur, D. D. Johnson, and S. C. Sanderson. 2008. Age structure and expansion of pinyon-juniper woodlands: a regional perspective in the Intermountain West. USDA Forest Service Research Paper Report RMRS-RP-69.

Schroeder, M. A., C. L. Aldridge, A. D. Apa, J. R. Bohne, C. E. Braun, S. D. Bunnell, J. W. Connelly, P. A. Deibert, S. C. Gardner, M. A. Hillard, G. D. Kobriger, S. M. McAdam, C. W. McCarthy, J. J. McCarthy, D. L. Mitchell, E. V. Rickerson, and S. J. Stiver. 2004. Distribution of sage-grouse in North America. The Condor 106:363-376.

Swenson, J. E., C. A. ,Simmons, and C. D. Eustace. 1987. Decrease of Sage Grouse after plowing of sagebrush steppe. Biological Conservation 41: 125-132.

Tausch, R. J. 1999. Historic pinyon and juniper woodland development. Pages 12-19 *in* Proceedings: ecology and management of pinyon–juniper communities within the Interior West. Monsen, S. B. and R. Stevens, editors. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, RMRS-P-9. Ogden, Utah, USA.

Utah Division of Wildlife Resources (UDWR). 2002. Strategic management plan for sage-grouse. State of Utah Department of Natural Resources, Division of Wildlife Resources, Publication 02-20, Salt Lake City, Utah, USA.

Wirth, T. A., and D. A. Pyke. 2003. Restoring forbs for sage-grouse habitat: fire, microsites, and establishment methods. Restoration Ecology 11:370-377.

Additional Photos

Removal of slash and uncut trees from transects was time consuming and difficult.

Although tree density varied across the study plots, sagebrush, forbs, and grasses grew within a few feet of every transect.