

Technical Note

**Greater Sage-Grouse
Response to
Sagebrush
Management in South-
Central Utah**



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Greater Sage-Grouse Response to Sagebrush Management in South-Central Utah

Introduction

Greater sage-grouse (*Centrocercus urophasianus*) depend upon sagebrush landscapes found throughout the West. Sage-grouse populations have been experiencing declines that have largely been attributed to the loss or deterioration of sagebrush habitat. Additionally, dense sagebrush in brood-rearing habitat may reduce or eliminate herbaceous understory cover and diversity, which may impact sage-grouse productivity. Sage-grouse prefer an open shrub canopy cover with plentiful grasses and forbs for brood-rearing habitat. These areas typically provide insects, an important component of the chicks' diet.

The Western Association of Fish and Wildlife Agencies (WAFWA) identified a need to conduct experiments of sufficient scale to demonstrate the effect of various management practices stabilizing and enhancing sage-grouse populations and sagebrush ecosystems (WAFWA 1999). The scientific literature clearly indicates that sage-grouse are dependent on large expanses of sagebrush-dominated landscapes. However, more information is required regarding the appropriate management techniques and scale of management activity within these areas to improve seasonal habitats for sage-grouse.

The USDA Natural Resources Conservation Service has placed a high priority on encouraging conservation practices on private lands and other nonfederal lands to benefit at-risk species like sage-grouse. Passage of the Farm Security and Rural Investment Act of 2002 (Farm Bill) authorized programs such as the Wildlife Habitat Incentives Program (WHIP) to provide cost-share to landowners to

implement conservation practices to improve wildlife habitat. With increased application of conservation practices designed to benefit wildlife on private land, there is a need for better information regarding the effects of specific conservation practices and technologies on at-risk species.

The purpose of this study was to assess the effects of sagebrush canopy cover reduction on sage-grouse use of historical brood-rearing habitat. This study was conducted on Parker Mountain located in south-central Utah (figs. 1 and 2). Parker Mountain is a unique high-elevation sagebrush-dominated plateau at the southern edge of greater sage-grouse range. It has relatively stable numbers of greater sage-grouse and contains some of the largest contiguous tracts of sagebrush in the state.

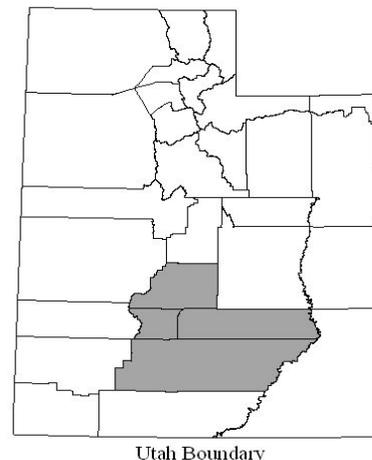


Figure 1. Location of Sevier, Piute, Wayne, and Garfield counties within Utah.

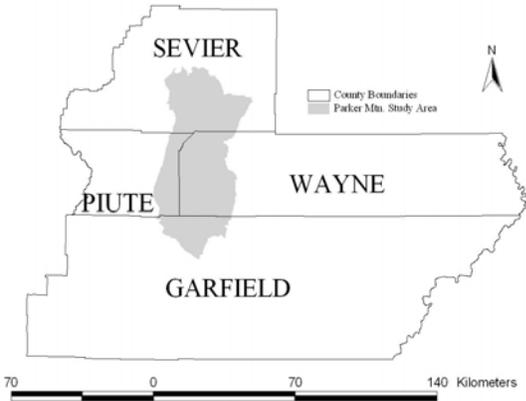


Figure 2. Location of Parker Mountain study area.

We selected Parker Lake Pasture (PLP) to conduct this study because it included important sage-grouse brood-rearing areas and exhibited poor understory vegetation cover and diversity, which was believed to be impacting sage-grouse chick survival. This mid-elevation pasture (8850–9500 ft) received, on average, 16-20 inches of precipitation, annually, most in the form of snow and late-summer monsoons.

Restoring Sagebrush Cover to Optimal Levels

Current guidelines recommend maintaining a shrub canopy of 10–25% for brood-rearing areas (Connelly 2000). Therefore, sixteen 100-acre plots within mountain big sagebrush stands with approximately 40% canopy cover and limited herbaceous understory were selected to receive one of four treatments (chemical, Dixie harrow, Lawson aerator, and no treatment) with 4 replicates of each. Treatments were conducted in 2000 and 2001. The chemical treatment used an herbicide (Tebuthiuron/ Spike 20P) applied at low rates to kill a fraction of the sagebrush within the treated area. Although the herbicide was applied over the entire plot we were unable to determine the exact percentage of sagebrush treated within each plot since low application rates of Tebuthiuron results in partial kill of sagebrush. The mechanical treatments included the Dixie harrow and Lawson

aerator. The Dixie harrow (fig. 3) has connected pipes with alternating harrows (fig. 4) that rip up sagebrush and scarify the bare soil. The Lawson aerator (fig. 5) is a large drum aerator (fig. 6) that crushes larger, woodier sagebrush without impacting the soil. Within the Dixie harrow and Lawson aerator plots approximately 30% of the area was treated to create a mosaic.



Figure 3. Dixie harrow set-up.



Figure 4. Dixie harrow pipes ripping up sagebrush.



Figure 5. Lawson aerator set-up.



Figure 6. The drum aerator of the Lawson aerator.

Vegetation Response to Reduced Canopy Cover

Figure 7 represents pre-treatment vegetation cover in 2000 and post-treatment vegetation cover in 2003 and 2004 for control and treated sites. Shrub cover was comprised predominantly of sagebrush (*Artemisia* spp.) and rabbitbrush (*Chrysothamnus* spp.) species. Overall, shrub cover decreased and grass and forb cover increased following treatments. Shrub cover was reduced by at least half for all mechanically-treated sites;

however, Tebuthiuron sites appear to have experienced less shrub reduction than other treatments. Because this is likely due to changes in sampling methods over the course of the project, Tebuthiuron should not be considered inferior to mechanical treatments for shrub reduction (Dahlgren et al. 2006). Current guidelines (Connelly et al. 2000) recommend herbaceous (non-woody) cover be at least 15% in brood-rearing habitat. None of the treatments showed a significant response for grass cover, possibly due to grazing activity (livestock, pronghorn, jackrabbits) and the drought that followed the treatments. Tebuthiuron- and Dixie harrow-treated plots contained more forb cover than did Lawson aerator and control plots. In Tebuthiuron-treated plots the surge in forb cover brought herbaceous cover to within recommended guidelines. Mechanical treatments reduced shrub cover similarly. However, based on the before-to-after treatment comparisons, Lawson aerator was less effective at increasing herbaceous cover, probably due to the rocky terrain of our study plots, which caused the aerator to bounce and prevented consistent disturbance between plots.

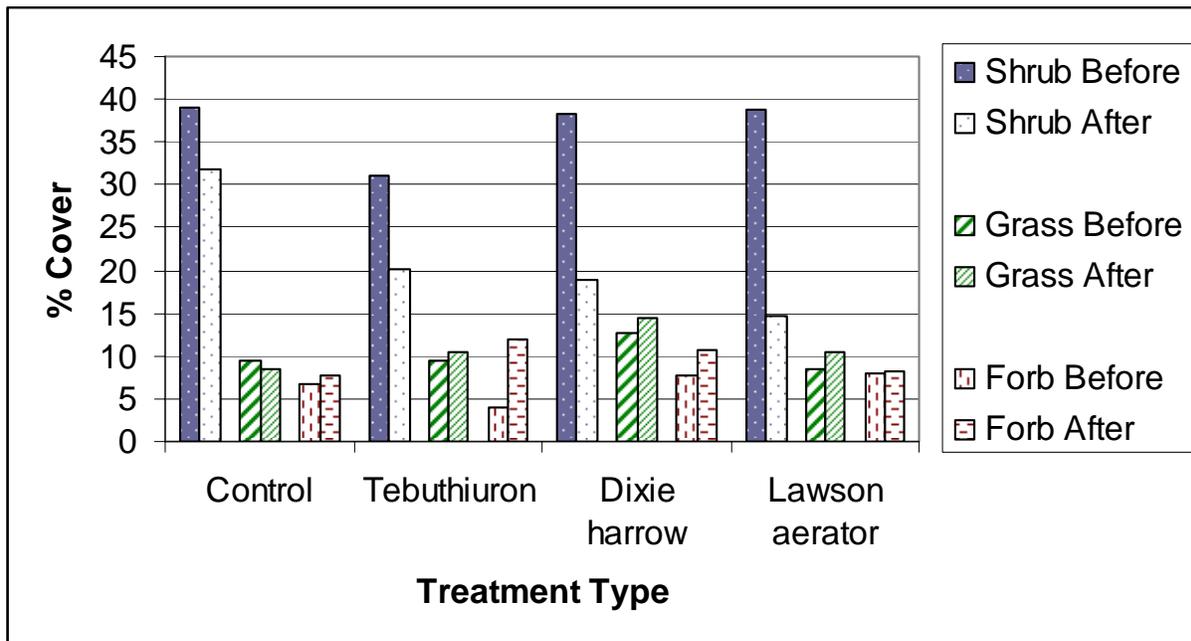


Figure 7. Vegetation cover on treatment sites before treatment and after treatment.

Sage-Grouse Response to Reduced Canopy Cover

To determine sage-grouse use, we surveyed all the study plots in August 2003 and 2004 for the presence of sage-grouse droppings (pellets). We found more pellet clusters in Tebuthiuron plots than any others (fig. 8). In all plots, sage-grouse use was greatest within 10 yards of the edge of the treatments where adjacent sagebrush cover was still available.

We also conducted bird dog surveys to assess sage-grouse use, in general, and brood use, specifically. In mid-late July and early August of 2003 and 2004 we surveyed each plot twice. We classified grouse flushed during the surveys as chick, hen, cock, or unknown. The number of broods equaled the number of flushed hens with chicks. Greater sage-grouse brood use was higher in the Tebuthiuron-

treated plots than in control plots, likely due to increased forb cover (fig. 9).

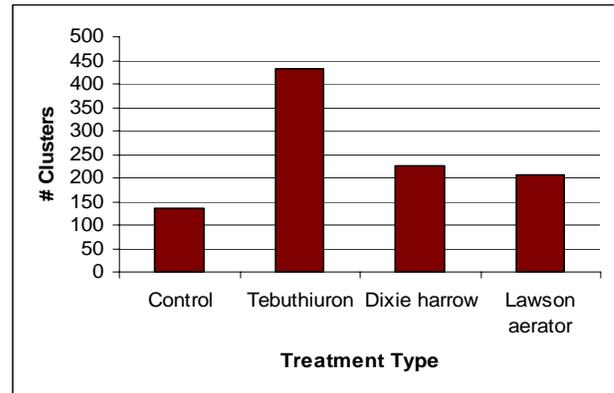


Figure 8. Comparison of numbers of pellet clusters found in treatment and control plots.

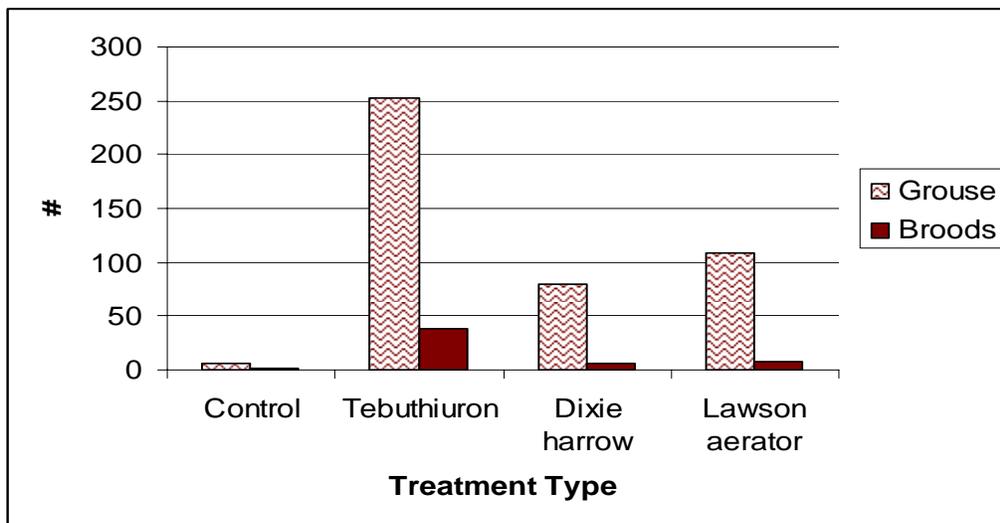


Figure 9. Number of sage-grouse and broods flushed by bird dogs in treatment and control plots.

Key Findings

On our site sagebrush cover was excessive (~40%) in brood-rearing habitats and needed to be reduced to free up resources for grasses and forbs. Although all treatments reduced sagebrush cover, we believe the “sagebrush skeletons” left by Tebuthiuron treatments contributed to the sage-grouse response we observed. In addition to providing escape

cover, these “skeletons” may have served to intercept more moisture, thus enhancing forb response. Additionally, the Tebuthiuron treatment resulted in a multitude of “feathered” or less distinct edges. If partial kill of sagebrush results from this treatment, distance to edge of intact sagebrush may not be as important. On our site partial kill resulted from the low rate of Tebuthiuron applied. Soil texture and depth, sagebrush vigor, precipitation regimes, and other environmental conditions would affect the

resulting percentage of sagebrush killed. Pretreatment data measuring these various factors would help guide the best application rate. Based on our results, we believe the Dixie harrow and Tebuthiuron can be used to help meet sage-grouse brood-rearing habitat needs in mountain big sagebrush communities where dense (>25% shrub cover) stands of sagebrush limit the herbaceous understory.

Summary

Appropriate levels of sagebrush are key to maintaining and improving sage-grouse populations. Today the quality of some of our rangelands is degraded. This is due to many factors such as improper livestock grazing, expansion of exotic grasses, considerable increases or decreases in sagebrush density, increased soil erosion, changes in fire regime, and conversion of sagebrush to seeded pastures, croplands, subdivisions, and roads. These changes have had adverse effects on our sage-grouse populations. Habitat management for sage-grouse should encourage a mosaic of habitat types with appropriate combinations of shrubs, grasses, and forbs.

Recommendations

Before reducing sagebrush cover through treatments, it is vital that you work with your state wildlife agency and/or your area's sage-grouse local working group to learn if your sage-grouse population is migratory or non-migratory and which areas are used by sage-grouse in the winter. This is important since many habitat restoration projects are carried out on sites with taller sagebrush plants. Caution should be exercised in applying these treatment techniques to sites with different elevations, annual precipitation, subspecies of big sagebrush, or soil substrates.

Because sage-grouse preferred to use the edge of the treatments where both cover and food were readily available, we suggest that widths of Dixie harrow or Lawson aerator treatments not exceed 60 yards; widths of intact sagebrush of at least 60 yards should be left standing between treatment swaths. Rather than treat large blocks of sagebrush at a time,

we suggest an alternative strategy of treating smaller patches or plots for brood-rearing activities. More sinuous treatment designs with mechanical treatment widths following the above guidelines would create more edge habitat and may be more beneficial to sage-grouse.

Although additional research is needed to document the cumulative effects on a larger scale, the cautious application of small brush treatments may be a viable conservation practice for agencies like the USDA Natural Resources Conservation Service to use for enhancing sage-grouse brood-rearing habitats.

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