

Science to Solutions

Grazing and Sagebrush Treatments: A 25-year Case Study in Utah



A male sage grouse rests on a lek on the Deseret Land and Livestock Company ranch. Photo by Todd Black.

In Brief: Sustainable grazing practices and sagebrush treatments enhanced herbaceous understory for sage grouse in years with average winters, but populations declined following severe winters. Sage grouse populations on the Deseret Land and Livestock (DLL) ranch increased for nearly 15 years when the ranch coupled deferred rest rotation grazing with small sagebrush removal projects. Birds responded positively as evidenced by lek counts that were higher and more stable on DLL than in nearby northeast Utah and western Wyoming. Total sagebrush removal cumulatively modified approximately 15% of DLL's sage grouse habitat as individual small-scale projects added up through time. Lek counts on DLL declined on the ranch and elsewhere following extreme winter and spring conditions. The cumulative effects of sagebrush removal may have contributed to declines on DLL due to less sagebrush food and cover for birds during severe weather.

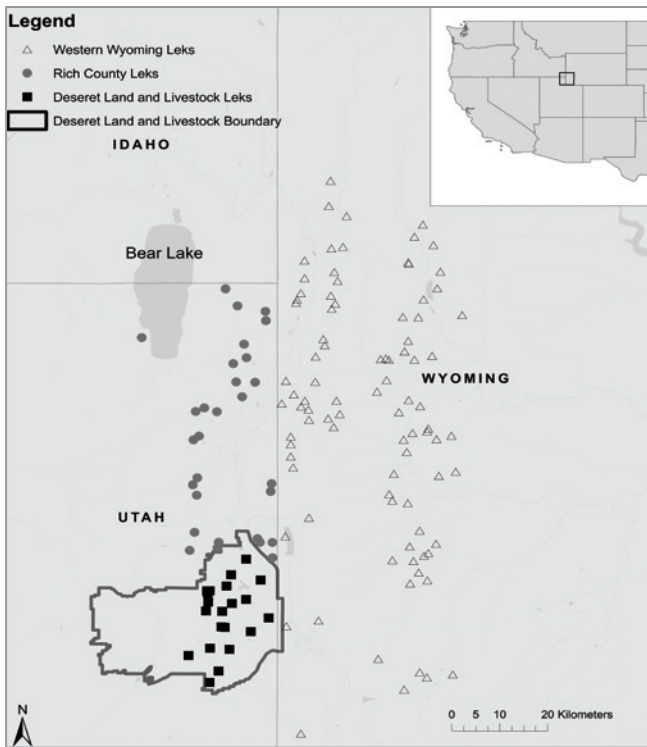
Long-term Monitoring Provides Unique Management Perspective

Sage grouse populations and land use patterns have been monitored for decades in eastern Utah and western Wyoming. Each spring, personnel from the Utah Division of Wildlife Resources, Wyoming Game and Fish and Deseret Land and Livestock (DLL) count males on leks as an index to population size. Likewise, public and private land managers record their grazing management and frequency of sagebrush removal. Recently, scientists at Utah State University, led by Wildlife Extension Associate Dr. David Dahlgren, along with Dr. Randy Larsen from Brigham Young University and scientists from other institutions, used these long-term datasets to evaluate sage grouse response to

variations in grazing regimes and extent of sagebrush removal. Comparisons are possible because sagebrush habitats on DLL, Rich County, Utah, and western Wyoming are similar in their soils, elevation, vegetation types and weather patterns.

Grazing Management

In northern Rich County, Utah (RICH) and southwest Wyoming (WWY), the landscape is managed largely by the Bureau of Land Management with some private lands interspersed that are managed as part of public grazing allotments. These lands are generally grazed May through September as large open pastures with little rest during the vegetation's growing period. Stocking rate for these areas is approximately 0.08 - 0.16 animal unit months (AUM) per acre.



Location of greater sage grouse leks in three study areas used to assess sage grouse population response to differences in range management, 1989–2013. Study areas were Deseret Land and Livestock (DLL; dark squares), north Rich County, Utah (RICH; filled circles), and western Wyoming (WWY; open triangles).

Adjacent to these public lands, the Deseret Land and Livestock (DLL) ranch manages nearly 200,000 acres in northeast Utah as a private working cattle operation. The ranch uses a prescriptive grazing strategy where cattle are managed in three to four large herds and rotated through pastures to graze for one to two week periods from May to September. Up to 30% of DLL's pastures receive a full year's rest after grazing and pastures are not grazed during the same growing period in later years. The ranch is stocked at a rate of 0.26 - 0.33 AUM per acre, nearly double RICH or WWY.

Sagebrush Treatments on DLL

In addition to prescriptive grazing, managers on DLL included sagebrush removal as a management practice with the intention of creating a mosaic of vegetation and successional stages. The goal was to increase plant production and species richness by reducing plant competition with sagebrush, creating complexity of vegetation, and reducing fuel loads or "green stripping" to lessen impacts from catastrophic wildfire. The ranch primarily removed 250- to 1,500-acre patches of Basin Big Sagebrush or Mountain Big Sagebrush at middle to high elevations in sage grouse breeding and late brood-rearing

habitats. Removal areas included meandering edges allowing untreated islands of sagebrush to intersperse with treated areas using five primary treatment methods.

From 1992-2013, approximately 1.5% of DLL sagebrush was treated each year, either through small natural wildfires or prescribed treatment. Over those years, cumulatively 15% of their mid and high elevation sagebrush habitats were treated. During the similar period, only 2% of the RICH study area was treated (1993-2009, treatments were primarily wildfire and Lawson aerator) and 8% of the WWY area (1995-2008, treatments through prescribed fire and Tebuthiuron) was treated.

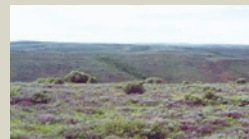
Several different types of treatment were used on DLL to remove sagebrush. After treatment, the area was reseeded with grasses and forbs.



Pulling a disk or chain harrow behind a tractor rips and crushes sagebrush and disturbs the soil surface.



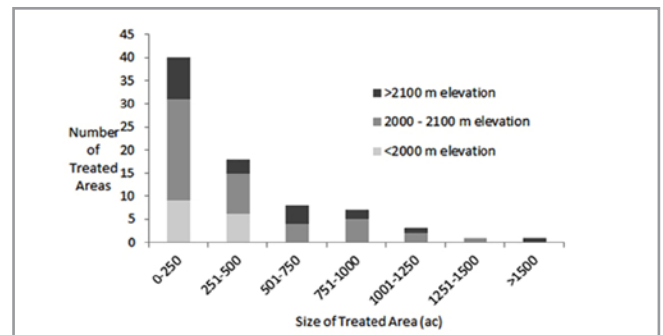
A Lawson aerator is a large, weighted drum pulled behind a tractor that crushes sagebrush and impacts the soil surface.



Tebuthiuron (i.e. Spike) is a chemical herbicide applied aerially in the fall in pellet form to kill sagebrush.



A controlled burn on the DLL ranch as seen from the air.



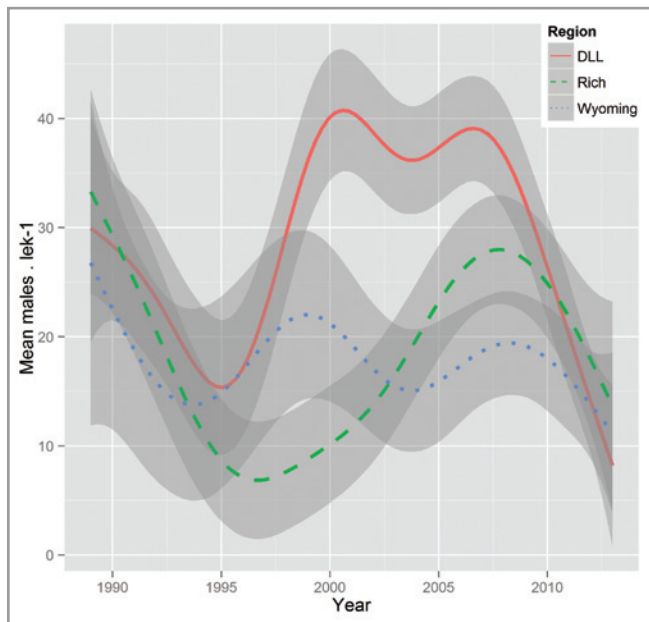
Frequency of sagebrush treatments by size (acres) on Deseret Land and Livestock ranch in northern Utah, 1989-2013, demonstrating that smaller treatment areas were much more common.



Photo by Todd Black.

Sage Grouse Response

Because of the long-term population data available throughout the study area, scientists were able to evaluate the population changes and compare that data with knowledge of habitat treatments. While the number of males per lek on DLL initially decreased, the population rapidly increased in the late 1990s to early 2000s and sustained those high population levels for nearly a decade. Long-term stability of the DLL population closely follows the period where prescriptive grazing practices, coupled with moderate sagebrush treatments, were taking place on the ranch. Pointing dog surveys showed that areas that were treated through burning or disking showed increased numbers of sage grouse; 80% of both adults and broods used areas within about 200 feet of a habitat edge. These population trends were significantly higher, and lasted longer than cyclical increases seen in the RICH and WWY populations.



Mean counts of males per lek for greater sage-grouse on Desert Land and Livestock (DLL) ranch in northern Utah, Rich County, Utah (RICH), and western Wyoming (WWY), USA 1989–2013.

However, starting around 2009, the DLL sage grouse population began to fall rapidly and by 2013 the lek counts were not different from RICH and WWY populations. Dahlgren and his team suggest that the population drop on DLL happened at the same time as adverse weather conditions in winter and spring 2010 and 2011 as well as the accumulation of acreage of sagebrush treated. With higher than average snow levels, the scientists suggested that the treatments could have reduced the availability of sagebrush food and cover for nesting and especially winter seasonal habitats.



A view of a mechanical sagebrush treatment on DLL property showing meandering edges of treated areas with remaining sagebrush.

Sagebrush Treatment a Delicate Balance

Habitat management practices on DLL seemed to boost sage grouse populations for nearly 15 years as the lek trend data shows higher sustained population levels when compared with nearby populations. Herbaceous vegetation on the ranch improved through grazing practices that allowed adequate rest during growing seasons, as well as small-scale sagebrush treatments that reinvigorated grass and forb cover. According to the study authors, however, those population gains became at risk as extreme weather conditions occurred, alone or in combination, with the acreage accumulation of sagebrush removal, eventually impacting grouse populations.

While sagebrush manipulation can be an important component of sage-steppe restoration, these findings illustrate the delicate balance needed when conducting sagebrush treatments in sage grouse habitats, further

highlighting the importance of detailed assessments when developing management prescriptions. Before sagebrush removal treatments are undertaken, knowledge of the proposed treatment area's elevation, precipitation and vegetative structure as well as understanding seasonal habitat use patterns by sage grouse is critical. This can help delineate treatments that keep adequate sagebrush on the landscape for food and cover during seasonal weather extremes. Also, sagebrush treatment footprints should be prescriptively designed, accounting for sage grouse use patterns (prefer areas within 120 feet of edge) and cumulative effects of other impacts affecting sagebrush availability across the larger landscape.

Sagebrush removal rates should not exceed recovery rates, and wintering and nesting habitats should maintain adequate amounts of tall sagebrush canopy cover. ~Dr. David Dahlgren

These recommendations follow closely with the recently published *Restoration Handbook for Sagebrush Steppe Ecosystems* that can help practitioners think critically about the role of sagebrush treatments in sage-steppe conservation. This guide recommends evaluating sagebrush steppe ecosystems using a hierarchical approach that assesses site-specific projects within the larger landscape context. It also integrates sage grouse specific needs with sagebrush ecosystem properties, such as resilience to disturbance and resistance to invasive cheatgrass, to help managers evaluate various risks and trade offs. The 25-year case study from Utah adds important insights to help conservationists achieve the collective goal of self-sustaining sagebrush ecosystems capable of supporting sage grouse and other sagebrush-dependent wildlife.

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To learn more about sage grouse conservation and the Sage Grouse Initiative, visit the SGI website at <http://www.sagegrouseinitiative.com/>

To find your local NRCS Service Center, visit the NRCS website at <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/contact/local/>

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