

SAGEBRUSH, SAGE GROUSE, AND RANCHING: A HOLISTIC APPROACH.

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Abstract: For twenty years Deseret Land & Livestock ranch (DLL) has remained profitable while maintaining diverse, abundant wildlife populations in Northern Utah sagebrush-steppe. Wildlife and livestock are viewed as co-dependent – the economic and ecological health of the ranch requires that both prosper. A holistic, adaptive management strategy for sagebrush range evolved that includes: monitoring wildlife abundance and diversity, time-controlled grazing (intermittent herbivory and rest) and managing for multiple, complex and interspersed age classes of sagebrush by periodically increasing forbs and reducing sagebrush density (i.e. fire, chemical or mechanical brush-thinning treatments applied to 1-2% of the ranch annually). Some mechanical treatments include planting functionally desirable species of grasses, forbs and shrubs. Time-controlled grazing and brush-thinning efforts increased landscape complexity and herbaceous plant cover on both upland and riparian habitats. Wildlife abundance and species richness have remained high as the cattle stocking rate increased. The ranch supports over 275 avian species and was designated an Important Bird Area by the Utah Audubon Society in 2002. Density of both pronghorn antelope (*Antilocapra americana*) and greater sage grouse (*Centrocercus urophasianus*) have increased under this management strategy. Sage grouse densities on DLL are 12 times greater than on adjacent sagebrush-steppe habitats being grazed summer-long. DLL range-restoration and management expenses are being recovered through increased livestock production and recreation revenues. We suggest time-controlled grazing is functionally and esthetically preferable to either season-long grazing or livestock removal. Further, managing for a productive system and diverse landscape can be economically self-sufficient and ecologically sound - simultaneously enhancing at-risk wildlife populations and ranching. Efforts underway to replicate this approach (using a Coordinated Resource Management Planning process) on mixed private/public land allotments are discussed.

Key Words: Deseret Land & Livestock, holistic ranching, sagebrush-steppe, restoration, time-controlled grazing, greater sage grouse, pronghorn antelope

Introduction

Livestock grazing discussions can be polarized affairs. Depending on point of view, livestock are alternately considered the bane or the ‘bread and butter’ of intermountain rangelands. While many rural families consider livestock grazing essential to maintaining income, lifestyle and open space values, some livestock grazing practices are linked to undesirable ecological conditions in sagebrush rangelands (Fleishner 1994, West 1999).

Concerns have resulted in numerous symposia, studies or listing petitions for many wildlife species of the sagebrush-steppe; most notably sage grouse. Many individuals and organizations question the wisdom of grazing or otherwise ‘managing’ sagebrush rangelands. Others, particularly ranchers, argue that grazing is a sustainable use of sagebrush range, many wildlife species benefit from ranching, and working ranches may be the most practical hope for maintaining open space and rural economies in the west. A rift exists; between those who feel these rangelands and their obligate species would be better served by managing for desired rangeland conditions, and those who favor removing livestock and grazing land “improvements” and letting nature reign.

While focusing on greater sage grouse and sagebrush, the following discussion more broadly chronicles a 25 year effort to manage a large ranching operation - Deseret Land & Livestock ranch - for multiple economic, wildlife conservation, land health, and community-based goals. This on-going effort has required cooperation between multiple landowners, conservation organizations and government resource management agencies - working together toward the mutually beneficial goals of maintaining healthy watersheds, agricultural values and wildlife populations, using monitoring and management, now and for future generations.

Landscape Description

DLL ranch encompasses approximately 215,000 acres (87,000 ha) of private and public land in northeastern Utah. The eastern half of the ranch is predominantly flat to rolling sagebrush-steppe,

elevations range from 6500-7000 feet (1980-2130 m). Annual precipitation averages 10 inches (25 cm) (NOAA). Ninety percent of DLL forage growth occurs mid-May through early-July. Dominant sagebrush-steppe vegetation includes Wyoming big sagebrush (Artemisia tridentata wyomingensis), Basin big sagebrush (A. t. tridentata) over an understory dominated by crested wheatgrass (Agropyron desertorum) (planted in the 1960's) or mixed native herbaceous species (Danvir 2002).

The western half of the ranch is more mountainous terrain, with elevations ranging from 6200-8700 ft (1890-2650 m) and rainfall increasing from 15-35 in (38-89 cm) from east to west. Vegetation includes a diverse and interspersed mix of aspen (Populus tremuloides), conifers, mountain meadows, Mountain big sagebrush (A. t. vaseyana) and diverse other plant species (Danvir 2002). The majority of the DLL sage grouse and sagebrush range occurs in Rich County Utah, with lesser acreages located in Morgan County Utah and Uintah County Wyoming.

Historical Management

Written accounts (Russell 1955, Rawley 1985) and archeological evidence (Shields 1968) indicate that large ungulates including elk (Cervus elaphus), mule deer (Odocoileus hemionus), bighorn sheep (Ovis canadensis), pronghorn and bison (Bison bison) historically foraged on DLL and vicinity.

DLL has been privately owned since formed in 1891. Initially the ranch was managed for sheep and wool production, accommodating upwards of 60,000 ewes annually (McMurrin 1989). Since the 1950's, cattle have replaced sheep as the principal livestock on DLL. DLL currently grazes cattle on approximately 150,000 acres (60,750 ha) of private lands and 13,000 acres (5,265 ha) of Bureau of Land Management (BLM) mountain and sagebrush-steppe range.

Initially, DLL pastures were grazed season-long by cattle April through October. Cattle relied heavily on stockpiled hay November through March and calving occurred in March. By the late 1970's, cattle production, range health and ranch profitability were judged less than desirable, forcing the ranch owners to consider economic alternatives for the ranch including commercial and residential development (Wolfe et al. 1996). After assessing the production capabilities of the various irrigated, range and forested acres, the decision was made to implement changes to the overall cattle, range and wildlife management

philosophy of the ranch. In so doing, we hoped to maintain an ecologically and economically productive working ranch, generating income while maintaining or enhancing watershed, wildlife and open space values (Wolfe et al. 1996).

Fundamental Management Changes

In the late 1970's a holistic management strategy began emerging on the ranch (Savory 1988). This approach involved viewing the ranch as a whole, and adopting an adaptive management approach by which management practices were evaluated according to their effectiveness in achieving range condition, wildlife abundance, wildlife diversity, livestock production and ranch economic goals.

Wildlife Management

In cooperation with the Utah Division of Wildlife Resources (DWR) the ranch began managing native ungulates for sustainable fee-hunting (Wolfe et al. 1996). This involved managing the age structure for mature male deer, elk, pronghorn and moose (Alces alces) populations, coupled with appropriate removal of females to maintain population size. Ranch wildlife management was further improved through enrollment in the Utah Cooperative Wildlife Management Unit program (CWMU). We believed a mix of wild and domestic ungulates (multi-species grazing) would best turn forage into dollars while maintaining ecosystem stability (Ritchie and Wolfe 1994a, Danvir and Kearl 1996). Wildlife revenue-generating enterprises eventually grew to include fee-fishing and guided bird-watching programs.

Livestock Production and Irrigated Lands Management

Cattle production practices were modified to develop a better fit between DLL's cattle and climate. Calving was begun later, in April, mirroring the reproductive cycle of the native grazing ungulates (elk and bison) and aligning nutritional requirements of pregnancy, lactation and breeding with peak range forage values (Simonds 1995, Wolfe et al. 1996). Again taking direction from the wild ungulates, we identified and selected for smaller-bodied cattle producing small (birth weight) but fast-growing calves, aiming for earlier weaning dates and lower calf costs.

Changes were also made to the management of irrigated lands and winter cattle costs. While comprising less than five percent of the ranch acreage, irrigated lands produce 55% of the cattle forage.

Cost and tonnage of hay production was evaluated by pasture, and irrigation expenses were focused on the most productive pastures. Cattle were taught to winter-graze selected pastures (less hay fed), further reducing winter costs.

Range Management

Grazing management

Range grazing practices changed significantly. Years of season-long grazing had reduced ground cover, particularly near water sources. Time-controlled grazing (Savory 1988) was implemented to improve livestock distribution, plant recovery and land health. This strategy was implemented and monitored in collaboration with BLM and the Natural Resources Conservation Service (NRCS).

As with traditional grazing strategies, DLL's cattle stocking rate is determined based on available forage resources, livestock and wildlife performance goals, and desired range condition. Time-controlled grazing differs, however, from other strategies in the way livestock are moved and distributed across the landscape. Time-controlled management plans focus foremost on providing adequate periods of rest for recovery between grazing bouts. Observations suggested sagebrush-steppe pastures should generally be rested a minimum of one year to ensure plant recovery (G. Simonds, B. Hopkin and B. Teichert personal communication). Once recovery periods have been established, grazing schedules are developed based on the principles of **time** and **timing**. **Time** refers to the length of time plants are exposed to grazing and **timing** to the season of use and stage of plant phenological development (Savory 1988). In practice this entails alternating rather short periods of herbivory with adequate recovery periods before livestock return, and avoiding grazing the same pasture at the same time each year. The duration of grazing in a pasture (**time**) is designed to minimize re-biting of individual plants, ideally livestock are moved to the next pasture before herbaceous plants have re-grown sufficiently to be bitten a second time. On DLL, pastures are grazed for shorter periods (generally less than 10 days) May-June, when herbaceous plants are growing rapidly. Conversely, during seasons when herbaceous plants are dormant or growing slowly, re-biting concerns are minimal and grazing periods can be longer. **Timing** goals are best achieved by

waiting more than 12 months before cattle return, i.e. varying the time of year individual pastures are grazed.

Shortening grazing periods required more pastures, fewer herds and higher stock densities (a few large herds moving quickly through several pastures in a year). On DLL, cattle are run in two or three herds numbering 1500-3000 head each. On average, 90 percent of the DLL cattle occur on less than 10 percent of the landscape at any given time (consequently 90 percent of the land is simultaneously recovering from livestock grazing). Cattle (and other ungulates) at higher densities tend to be less selective in their food habits and increase their diet breadth to include plant species not grazed or grazed infrequently at lower densities (Savory 1988, Provenza 2003). Whereas selective herbivory by ungulates leads to increased dominance of chemically defended, woody plants, intensive herbivory can maintain or increase the dominance of herbaceous plants (Augustine and McNaughton 1998). DLL managers use stock density, range rest, grazing time and timing to influence forage quality, plant density, species composition and structure of the plant community (Savory 1988, Severson 1990, Danvir and Kears 1996).

Range treatments

In the past 12 years DLL has also incorporated prescribed burning (cool season burns), chemical (tebuthiron or “Spike”) and mechanical range treatment practices (brush-thinning with a Lawson Pasture Aerator or disking and planting seeds). In combination, these practices have been applied at an average rate of 1-2 percent of DLL’s sagebrush-range annually, and are designed to reduce woody vegetation and increase herbaceous abundance while maintaining or increasing plant species richness. Treatments range from less than 100 acres (40 ha) to over 1000 acres (400 ha) in size, and are widely distributed throughout the ranch sagebrush habitat. Treated areas are irregular in shape, have relatively high treatment edge/area ratios, include islands of untreated sagebrush, and are patterned to achieve the structural effects of a cool season sagebrush burn.

Monitoring

Throughout the past twenty-five years DLL has monitored selected indicators of livestock performance, wildlife condition, abundance and diversity, range response and ranch economics. The

ranch operates using comprehensive annual and five-year plans, with ecological and economic goals developed for wildlife, livestock and land. Monitoring results are reviewed and compared to annual and five year goals, and subsequent management practices may be modified based on these findings.

From 1992-1998, Ritchie and Wolfe (1994a) (and unpublished progress report 1998) monitored the various effects of total rest, herbivory by wild herbivores (big game and lagomorphs), and herbivory by both wild and domestic herbivores (controls) in DLL native sagebrush communities using replicated (three) sets of 90 x 90 meter exclosures. Biomass production was clipped in July (generally after one or more sites had been grazed) samples were oven-dried and weighed. Results were compared using paired t-tests. Aoude (2001) compared costs of various treatment methods (burns, plantings and tebuthion) with returns, in terms of increased herbaceous biomass, plant and wildlife species richness and abundance.

In 1984, DLL, DWR, BLM and Utah State University (USU) initiated sage grouse research in Rich County including repeated lek counts, radio-transmitted and unmarked sage grouse observations, estimates of insect abundance and vegetation condition. Goals included monitoring production and survival, and identifying seasonal grouse distribution and habitat use, foraging behavior, and effective management practices (Hunnicuttt 1992, Homer et al. 1993, Ritchie et al. 1994b, Danvir 2002).

Indices of big-game abundance, habitat use, herd composition, production and condition of harvested animals are collected annually on DLL. DLL, DWR and USU have also studied small mammal abundance, distribution and ecology (Beck 1994, Moroge 1998, Aoude 2001, A. Koslowski unpublished data 2004). A DLL bird species list has been compiled, and since 1995 three Breeding Bird Survey routes have been conducted annually. An intensive research effort in Rich County is currently documenting the effects of sagebrush thinning treatments on avian ecology at multiple scales (F. Howe, personal communication 2004).

Results and Discussion

Range and Riparian Results

Between 1980 and 1986 both upland sagebrush-steppe and lowland riparian areas showed increased herbaceous plant cover and decreased bare ground. Based on data collected by NRCS,

herbaceous plant ground cover increased by six percent 1980 to 1986 (Wolfe et al 1996). Eroding, poorly vegetated lowland riparian habitats improved markedly. In most cases, near stream vegetation (primarily perennial forbs and sod-forming graminoids), increased, streams narrowed and meanders formed while siltation and bare ground decreased (Wolfe et al. 1996).

Exclosure monitoring studies suggested time-controlled grazing had no significant impact on herbaceous production, but significantly reduced shrub biomass production (M.E. Ritchie and M. L. Wolfe unpublished progress report 1998). Within years, dry-weight herbaceous biomass production did not differ significantly between cattle excluded areas and controls. However annual shrub biomass production (primarily sagebrush) was significantly greater in cattle exclosures than in controls (100 and 70 grams/m², respectively, p=0.05). Between year variation in grass biomass production correlated with prior year (October –July) precipitation ($r^2=0.84$). Grazed areas maintained higher quality “green” vegetation longer into the year than did ungrazed areas (Danvir and Kearl 1996).

A remote-sensing evaluation of DLL sagebrush trend suggested increased complexity (increased variation in spectral signatures between adjacent pixels) and a five to eight percent increase in shrub cover from 1970 to 1999 (Washington-Allen 2002). This trend of increasing shrub cover prompted our range treatments. Aoude (2001) found that herbaceous biomass increased in sagebrush stands following all range treatments. Herbaceous biomass was generally increased by three to four times in disked plantings and two to three times in other treatments. Plant species richness (particularly forbs) increased significantly in tebuthiron treatments, disked plantings and higher elevation fall burns (Aoude 2001).

Wildlife Results

Sage Grouse

Management practices for sage grouse at DLL evolved from monitoring results. Homer et al. 1993 determined sage grouse in Rich County selected sagebrush of moderate height (16-24 inches, 40-60 cm) and 20-30% cover in most winters. However grouse on DLL concentrated in less available, taller (greater than 34 inch) sagebrush when snow depth exceeded 14 inches (35 cm) (Danvir 2002). Hunnicutt (1992) determined sage grouse preferred sagebrush cover greater than 17 percent and herbaceous cover

less than eight percent April through June, but sagebrush cover of less than 17 percent and herbaceous cover greater than 20 percent July through September. While nesting hens selected monotypic dense sagebrush stands, broods selected more diverse areas, having sagebrush stands interspersed with grassy openings and meadows (Hunnicut 1992). Arthropod biomass generally increased with herbaceous biomass (Danvir 2002).

Weather and habitat availability apparently interacted to limit grouse survival. We found lek attendance stable to declining following dry summers and declining steeply following deep-snow winters (Danvir 2002). It appeared grouse survival declined when birds were concentrated by extreme weather events into limited habitat patches (i.e. riparian meadows in dry summers and exceptionally tall sagebrush in deep snow).

DLL sage grouse and pronghorn production ratios (chick:hen and fawn:doe) were each three times greater in native sagebrush or grassland habitats (eight percent or greater forb cover) than in crested wheatgrass habitats (less than three percent forb cover). We hypothesized that grouse were alternately limited by lack of forb-rich areas (for brood rearing and drought survival) and tall, mature sagebrush at low elevations (for winter survival). Since much of the ranch is both summer and winter habitat for grouse, we implemented range treatments to produce an interspersed of mature, early and mid-seral sagebrush stands scattered throughout the landscape, providing opportunities for nesting, brood rearing and wintering grouse within pastures. We had observed numerous sage grouse foraging in dry-land alfalfa (Medicago sativa) on reclaimed oil pad-sites, particularly in dry summers (the deep-rooted alfalfa remained green while most other forbs desiccated). We began planting mixed species forb patches in crested wheatgrass stands and thinning patches of sagebrush (increasing herbaceous biomass) in select mature native sagebrush stands. Treatments were located and designed to simultaneously improve habitat for wintering elk, grouse broods, pronghorn fawns and cattle.

Densities of both leks and sage grouse on DLL-grazed rangelands are currently estimated to be 12 times the densities of traditionally grazed sagebrush-steppe habitats in Northern Rich County (Mitchell, 2003). Although DLL manages only 20 percent of the sagebrush range in Rich County, 80 percent of the

males and two thirds of the active leks occur on the ranch (Mitchell, 2003). DLL sage grouse lek counts, 1985-2004 are presented in figure 1. The multiple trend lines track the increasing number of leks found through the years. The two declines in male attendance (1986 and 1993) follow deep snow winters. Male attendance on leks increased 1994-2004, correlating positively with cumulative acres treated ($r^2=0.55$, $p=0.01$). Surveys revealed grouse densities were seven times greater in forb-rich burned or planted treatment areas than in paired controls (Danvir 2002). Birds flushed in treatments were primarily hens with broods. Eighty percent of grouse observed in treatments were within 180 feet (60 m) of sagebrush, either sagebrush “islands” or the treatment edge. Alfalfa was the most consistently occurring plant species at grouse feeding sites (Danvir 2002). However brood use increased both in burned and planted treatments in native sagebrush, as well as in forb patches planted in old crested wheatgrass stands.

Big Game

Our experience suggests cattle and big game abundance are not mutually exclusive. From 1980-2004, both the number of mother cows and the number of combined big game AUM equivalents increased on DLL. Summer adult elk abundance increased from an estimated population of 1000 to over 2000. Mule deer and moose abundance averaged 3500 and 100 adults, respectively. In sagebrush steppe range, the estimated pronghorn population increased from 100 to 800 adults, while cattle numbers were increased from 2500 to 5000 breeding cows. Big game production, body weights and antler mass generally remained at or above desired levels (R. Danvir, DLL Annual Wildlife Report 2004). Five to ten percent of the big game population is harvested annually. Danvir and Kearl (1996) comparing AUM's harvested by wildlife and livestock in the Morgan-South Rich DWR big game management unit past and present, concluded more AUM's are now being harvested and range is in better condition with multi-species herbivory (cattle, sheep, elk mule deer, moose and pronghorn) than occurred with essentially single-species grazing by sheep in the early 1920's.

Pronghorn responded favorably to 18 burned or planted treatments that increased forbs and decreased brush on DLL 1995 to 2001 (Aoude and Danvir 2002). While pre-treatment fawn production correlated negatively with population size ($r^2=0.89$, $p=0.0001$), suggesting density dependent production,

fawn production correlated positively with population size post-treatment ($r^2=0.70$, $p=0.04$) suggesting increased habitat quality and carrying capacity (Aoude and Danvir 2002). Both fawn production and population size correlated positively with cumulative acres treated ($r^2=0.81$, $p=0.005$ and 0.65 , $p=0.03$, respectively). Burned or planted areas were the only habitat types used preferentially by doe-fawn groups post-treatment.

Small mammals

Moroge (1998), studying the relationship between small mammal diversity and sagebrush island patch size following a wildfire burn on DLL, found highest diversity in burned areas where brushy cover was interspersed with herbaceous seed-producing areas. Aoude (2001) found reduced small mammal species richness and abundance on large DLL fall burns. He found no significant difference in richness or abundance on spring burns or disked and planted treatments and observed increased richness and abundance in areas chemically brush-thinned with tebuthiron.

The DLL whitetail prairie dog (*Cynomys leucurus*) population appears is distributed across approximately 10,000 acres of DLL sagebrush steppe. DWR data suggests the number of occupied acres does not appear to have decreased in the last 15 years (A. Koslowski, personal communication 2004).

This population occurs primarily in 40 year-old crested wheatgrass plantings on relatively flat, deep soils with less than 10 percent sagebrush cover (Beck 1994, A. Koslowski, personal communication, 2004).

Initial monitoring suggests pygmy rabbits (*Brachylagus idahoensis*) are widely distributed throughout the ranch in deep-soiled sagebrush habitats, including at least one sagebrush patch thinned with tebuthiron and one patch thinned with a Lawson Pasture Aerator (R. Danvir unpublished data 2004).

Other avifauna

Over 275 species of birds have been recorded on DLL. In 2002 the ranch was designated by the Utah Chapter of the National Audubon Society as a Utah Important Bird Area. Combined species richness (mean 124) and number of individuals (mean 3249) counted annually on three North American Breeding Bird Surveys exhibited stable trends 1995 through 2004 (figure 2). Aoude (2001) found no difference in

avian diversity between treatments types (burns, plantings and tebuthiron treatments) or their respective controls.

Economic results

DLL has remained profitable since adopting this approach. By developing cattle better suited to the environment, cattle pregnancy rates and growth rates (mean daily gain) increased (Wolfe 1996). In combination, the changes made to irrigated land and cattle management decreased winter hay costs (by half), decreased calf production costs and significantly increased cattle profitability (Wolfe 1996, DLL unpublished data). Wildlife recreation revenues, although generally less than 30 percent of ranch net revenue, are invaluable in years of poor cattle prices and provide DLL managers a means and motivation to manage for wildlife. Costs of range treatments varied, ranging from under \$5 per acre for spring burns, \$15 to \$25 per acre for tebuthiron and mechanical brush-thinning, and \$45 per acre for disked plantings (cost does not include archeological surveys). However cost per additional AUM produced was similar among treatments, ranging from \$1.50 per AUM for spring burns to \$2.50 per AUM for disked plantings.

DLL, like many western ranches, depends on both private and public range in order to achieve ranch goals. Agriculture is still a principal land-use and business in the rural west, e.g. over 90 percent of privately owned land in Wyoming is agricultural ground (Taylor 2003). Fifty percent of essential riparian and shrub-steppe habitats in Utah (D. Mitchell personal communication 2003) and of year-round big game habitats and at-risk migration corridors in Wyoming are privately owned agricultural land (Coupal et al. 2004, Feeney et al. 2004). Conversion of agricultural land to residential can negatively affect wildlife and rural economies. A summary of 83 studies by the American Farmland Trust (2001) comparing the cost of community services (i.e. fire, police, schools and other services) found that residential use cost counties an average of \$1.15 for every \$1.00 in county revenue collected, while agricultural land cost under \$0.50 per dollar in revenue (Coupal et al. 2002).

Formation of Working Groups

Foundation for Quality Resource Management (QRM)

By the 1990's DLL and other landowners in the Morgan-South Rich area were managing for both wildlife and livestock. DWR wildlife managers and landowners alike felt a need to coordinate management efforts. Through a series of discussions, landowners realized that the management practices on one ranch could influence wildlife distribution and abundance on adjacent lands. From this awareness of interdependence arose the Foundation for Quality Resource Management (QRM). The QRM mission statement is simply to "Manage for healthy watersheds, healthy wildlife populations and agricultural values, using sound science and management, now and for future generations". This landowner/agency collaboration increased understanding and cooperation between DWR and landowners, and has improved wildlife and habitat management (Danvir and Kearn 1996). QRM meetings provide an opportunity for DWR and other agency personnel to form relationships with landowners in a non-hostile environment.

Depredation issues, once a serious problem in Morgan-South Rich, greatly diminished as landowners began working together to solve common problems. Landowners owning big game summer range began to realize their wildlife programs depended on the economic survival of the winter range landowners-to whom big game could be a liability. Landowners realized that if the winter ranges were converted from agricultural to residential, wildlife and many landowners would suffer negative consequences (Danvir and Kearn 1996).

Landowners began assessing themselves a fee and identified priority management projects, such as sagebrush range restoration. QRM members then partnered with conservation groups and agencies having similar missions to fund and implement projects. QRM currently has three chapters in parts of four Utah counties, involving hundreds of thousands of acres of privately-owned sagebrush range. To date, over \$500,000 dollars have been raised through these partnerships and used to implement restoration projects on over 20,000 treated acres, enhancing wildlife populations on thousands of adjacent acres.

Cooperative Wildlife Management Unit Association (CWMU)

The CWMU Association includes landowners, operators and outfitters enrolled in Utah's CWMU program for big game management. This organization, landowner led and assisted by USU Wildlife Extension and DWR, was formed to help landowners and CWMU operators manage wildlife resources.

The group has developed a code of ethics, hosted numerous member meetings and tours and worked with DWR and the Utah legislature to better manage the 1.6 million acres of privately owned rangelands enrolled in Utah's CWMU program.

Rich County Coordinated Resource Management Process (CRM)

The Rich County CRM committee was formed in 2002, in part responding to a legal challenge to livestock grazing on BLM rangelands. The committee is sanctioned by the Rich county government, and includes private citizens, representatives of conservation and environmental groups, county government, and state and federal resource management agencies. The group developed a county-wide vision to manage for "rich, healthy ecosystems, sustainable wildlife populations, diverse recreational opportunities and a vibrant rural economy". They developed plans, obtained funding and began sagebrush-steppe restoration efforts on a demonstration project in north Rich County - the 30,000 acre Duck Creek allotment. This allotment includes both private, BLM and State owned lands. It is a multi-state deer wintering area, provides summer range for migratory avian species, and year-round habitat for sage grouse and pygmy rabbits. Initial surveys suggest high populations of pygmy rabbits, but low sage grouse abundance. Most of the allotment is dominated by mature sagebrush stands. The committee recommended that BLM adopt a management strategy that includes implementing time-controlled grazing management and creating early-mid seral sagebrush patches. Duck creek allotment project implementation and monitoring have begun, and the committee is currently assisting BLM with Environmental Assessments and developing county-wide plans based on the vision statement and adaptive management.

Conclusions

Based on our management and monitoring experience at DLL, we believe that time-controlled grazing and periodically creating forb-rich early-seral conditions in appropriate areas (i.e. brood and fawn-rearing areas) has increased sage grouse and pronghorn populations. We believe we have maintained an abundance of other plant and wildlife species in the sagebrush-steppe as well. By generating revenues from wildlife recreation and livestock production, we have paid the "learning" and management costs of this program. However the accomplishments described here would not have been possible without the

cooperation and coordinated activities of numerous agencies and adjoining landowners-striving to understand each others needs and manage for shared goals. We believe this success can be duplicated elsewhere, on both public and privately owned lands, if grazing and behavioral principles are understood and applied properly. There is a need for further research into economically and ecologically cost-effective ways of generating revenues from rangelands in order to fund land management activities, e.g. teaching livestock to forage on invasive weeds and brush as is being demonstrated by the BEHAVE consortium (www.behave@cc.usu.edu, Provenza 2003). Sage grouse and sagebrush steppe management is a process, not an event, therefore we believe the ecosystem management principles discussed here will need to be continued and improved in perpetuity to sustain the lifestyle, biodiversity, open space, water and soil quality values owed to generations unborn.

Intermittent herbivory by ungulate herds and fire have likely maintained herbaceous plant dominance and reduced the abundance of chemically-defended woody plants in arid rangelands (world-wide) for millennia (Augustine and McNaughton 1998). The current condition of sagebrush rangelands in North America in part result from man's management of fire and native and domestic herbivores (West 1999, Bonnicksen 2000). Our experience suggests wild and domestic herbivores can co-exist on and sustain healthy sagebrush range, if properly managed. We suggest undesirable range conditions on sagebrush rangelands generally result from undesirable management practices. To be successful, this means defining broadly supported, mutually agreed upon goals, and developing management strategies incorporating multi-species grazing to manage herbivory and succession. We have found that energy spent vilifying domestic livestock or wild ungulates is better invested understanding and implementing the behavioral principles responsible for the functioning of humans, animals, vegetation and ecosystems (Savory 1988, Provenza 2003).

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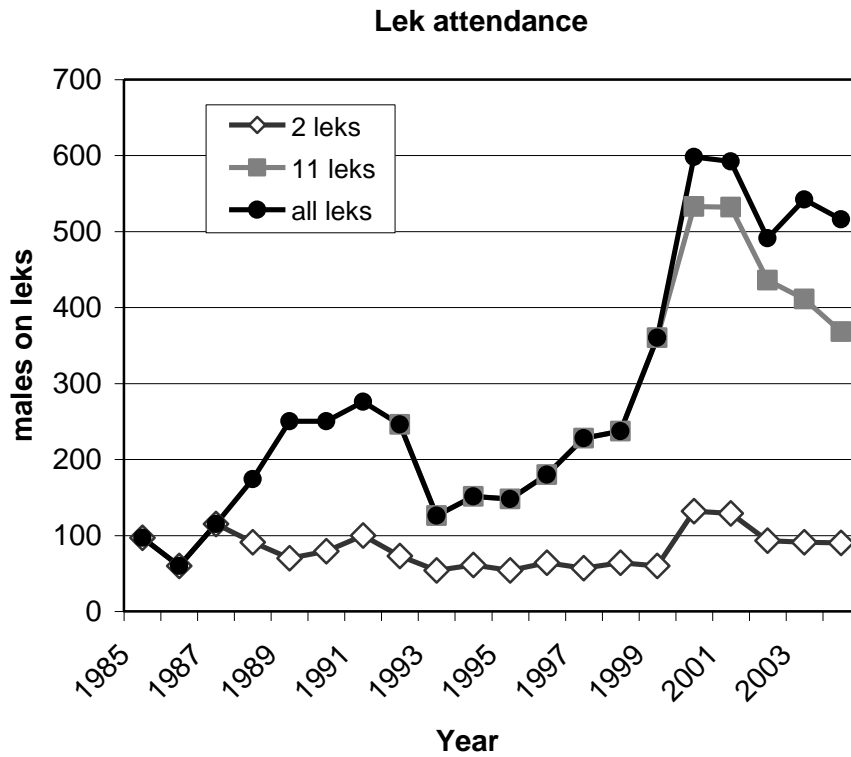


Figure 1. Number of male sage grouse counted on 2 leks (1985-2004), 11 leks (1992-2004) and all leks, Deseret Land & Livestock ranch, Woodruff, Utah.

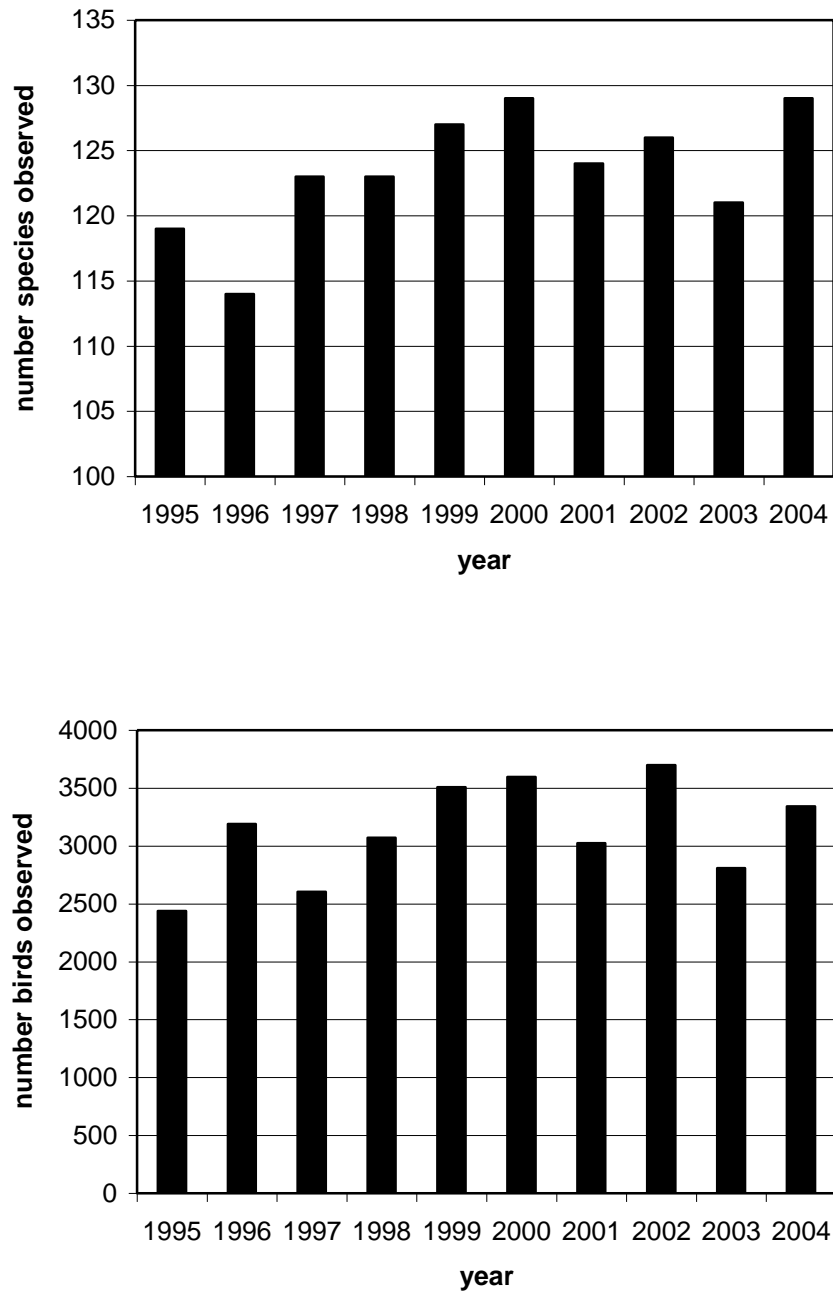


Figure 2. Combined number of species and birds observed annually (1985-2004) on three North American Breeding Bird Surveys conducted on Deseret Land & Livestock ranch, Woodruff, Utah.