

Forum

Are Natural Resources Conservation Service Range Management Investments Working at Cross-Purposes With Wildlife Habitat Goals on Western United States Rangelands?

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Abstract

Wildlife conservationists and agencies have recommended managing rangelands for vegetation heterogeneity to improve wildlife habitat, particularly for many grassland birds. However, range management focuses on livestock production and associated practices and structural items (fences, water developments) that are applied to improve livestock distribution. This article assesses the occurrence of livestock distribution-oriented grazing management in the spending and applied practices of the Natural Resources Conservation Service (NRCS), the federal agency charged with assisting private landowners with implementation of US Department of Agriculture conservation programs. NRCS applied practices and spending both suggest an emphasis on livestock distribution and associated structures, with almost 20 million ha of prescribed grazing systems, 10 000 km of fence, and 127 000 water facilities implemented in 17 western states with assistance from NRCS programs between 2004 and 2007. Ninety percent of funding for 2005 Conservation Security Program grazing enhancements supported investments or management related to livestock distribution. We suggest that increasing the emphasis of NRCS conservation programs and financial assistance on maintaining or increasing compositional and structural heterogeneity of vegetation, rather than on livestock distribution, could be an approach that unifies livestock production and wildlife habitat objectives. In particular, including vegetation heterogeneity as a central goal for upland wildlife habitat management could be a key opportunity to increase incentives for heterogeneity-promoting management on privately owned rangeland.

Resumen

Tanto los que proponen la conservación de fauna silvestre como las agencias federales recomiendan el manejo de los pastizales de manera que mejore la heterogeneidad de vegetación y así mejorar el hábitat, particularmente el hábitat de aves en los pastizales. Sin embargo, tradicionalmente el manejo de los pastizales se ha enfocado en la producción ganadera y las prácticas asociadas con la infraestructura (cercos, abrevaderos) que ayuden a mejorar la distribución del ganado. Este documento evalúa los programas del manejo del pastoreo enfocados a una mejor distribución de fondos y las prácticas del Servicio de Conservación de Recursos Naturales (Natural Resource Conservation Service ó NRCS), la agencia federal a cargo de asesorar a propietarios privados a implementar los programas de conservación del Departamento de Agricultura de los Estados Unidos (United States Department of Agriculture). Las prácticas aplicadas y el presupuesto de NRCS enfatizan sistemas que promuevan una mejor distribución del pastoreo y prácticas estructurales asociadas. Durante el 2003 y 2007 con la ayuda de NRCS con casi 20 millones de hectáreas con sistemas de pastoreo, se construyeron 10 000 kilómetros de cercos e instalaron 127 000 abrevaderos. Cincuenta por ciento de los fondos para 2005 del Programa de Seguridad de Conservación (Conservation Security Program) para el mejoramiento del pastoreo apoyaron prácticas o inversiones relacionadas con distribución uniforme de ganado. Sugerimos que un mayor énfasis en el programa de conservación del NRCS y el apoyo financiero para mantener o incrementar la composición y heterogeneidad estructural de la vegetación en lugar de la distribución del pastoreo del ganado podría unificar la optimización no sólo de la producción ganadera sino también el hábitat de la fauna. En particular, el incluir la heterogeneidad como meta esencial para el manejo del hábitat de fauna silvestre como las aves puede ser una oportunidad clave para dar incentivos promoviendo el manejo de la heterogeneidad en pastizales privados.

Key Words: ecosystem heterogeneity, grassland birds, grazing management, grazing systems, land management policy, livestock distribution, rangeland policy, wildlife management

INTRODUCTION

One of the goals of range management has been to improve livestock production through increasing distribution of livestock within pastures, likely resulting in more evenness of use. This has been accomplished by adding structures like cross

fencing to reduce pasture size and increase stock density, adding watering facilities to improve evenness of use, or behavioral modifications like herding, salt placement, and supplemental feeding (Vallentine 1990; Bailey et al. 2008). As a result of improved distribution, the spatial heterogeneity of grazing use within pastures is diminished (Barnes et al. 2008). More uniform livestock distribution has been promoted to increase forage availability to livestock and because of concerns that uneven grazing can increase damage to soils and vegetation in “overused” or sensitive areas and limit livestock access to “underutilized” areas (Vallentine 1990).

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At the same time, uneven grazing can be important for wildlife by generating heterogeneous habitat conditions similar to those created by historic disturbance regimes (Bailey et al. 1996; Fuhlendorf and Engle 2001). Vegetation heterogeneity is recognized by ecologists as an important factor in generating biodiversity observed in nature (Severson and Urness 1994; Benton et al. 2003; Rook and Tallwin 2003; Fuhlendorf et al. 2006) and has been posited as the basis for contemporary conservation (Reice 1994; Benton et al. 2003; Fuhlendorf et al. 2006). Avian ecologists have recognized the importance of compositional and structural heterogeneity in rangeland vegetation regarding bird habitats (Knopf 1996; Askins et al. 2007). In particular, wildlife conservationists and agencies have recommended managing western rangelands for vegetation heterogeneity to improve habitat in response to recent population declines for many grassland birds (Wyoming Partners in Flight 2002; Pool and Austin 2006; Askins et al. 2007).

Most western rangelands are privately owned and managed for livestock production. Consequently, unifying profitable livestock production with wildlife habitat needs is critical to maintaining healthy rangeland ecosystems and helping prevent future listings under the Endangered Species Act (Samson et al. 2004). The largest source of technical and financial assistance for the conservation and management of privately owned US rangelands is provided under the US Farm Security and Rural Investment Act of 2002 (the Farm Bill). The US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) is the federal agency charged with assisting private landowners with implementation of Farm Bill programs that support voluntary conservation practices and management. For example, the largest conservation program, the Environmental Quality Incentives Program (EQIP), promotes “agricultural production and environmental quality as compatible national goals” (USDA NRCS 2007b). The Conservation Security Program (CSP) aims to reward the highest levels of environmental stewardship through the promotion of “conservation and improvement of ... plant and animal life” (USDA NRCS 2007a). A primary NRCS goal includes supporting healthy wildlife habitat, particularly for at-risk species: NRCS’s 2005–2010 Strategic Plan states that “our priority for action is helping to maintain or enhance habitat for at-risk species so that populations remain stable or increase” (USDA NRCS 2004).

Here we review the implementation of livestock distribution and other rangeland- and wildlife management-related investments associated with NRCS programs from 2004 to 2007 on privately owned rangelands in 17 US western states: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. In particular, we 1) determined the most commonly implemented conservation practices receiving financial assistance on “grazed range” for all programs, 2) assessed CSP expenditures on grazing enhancements related to livestock distribution (e.g., prescribed grazing, fencing, pipelines, watering facilities, rest, deferment) versus all other practices (e.g., prescribed burning, wildlife, interseedings, range plantings, reduction of animal stress), and 3) surveyed local EQIP project prioritization sheets. Our goal was to evaluate whether NRCS grazing expenditures emphasized livestock distribution investments that may result

in reduced habitat heterogeneity and thus be working at cross-purposes with NRCS goals for wildlife conservation.

METHODS

Data on practices applied through NRCS programs were collected from the USDA-NRCS Performance Results System (PRS) Web database (USDA NRCS 2007c). Data were collected from the PRS annual Summary Conservation Practice reports, with the report specified to include practices applied through all NRCS programs, applied on grazed range, and applied on the 17 western states in question. Over 30 NRCS programs were covered, with the major programs being EQIP, CSP, Wildlife Habitat Incentives Program, Grassland Reserve Program, and Wetlands Reserve Program. PRS provides data on the amount of practices applied by state in the unit appropriate for the practice (most commonly in acres, feet, or number applied); PRS does not provide data on expenditures. Management practices were organized into those we assumed were related to livestock distribution (e.g., prescribed grazing, fencing, pipelines, watering facilities, rest, deferment) and other common practices that we assumed were related to other conservation activities (e.g., interseeding, prescribed burning, reducing animal stress, brush management).

In addition, we evaluated the relative expenditures for grazing enhancement practices in CSP. Data on CSP implementation were collected from NRCS CSP funding records. CSP practices were also divided between those we assumed were related to livestock distribution and those related to other conservation activities.

Finally, we reviewed ranking sheets used to prioritize EQIP projects in order to further explore the goal of NRCS grazing management programs. We surveyed 2007 ranking sheets from all western states and thoroughly reviewed all 2007 sheets for Wyoming. Ranking sheets are used by NRCS staff to prioritize projects for funding and therefore are a reflection of the goals of the programs and how the funding intends to be used. We did not have access to project-level data, which would have provided a clearer picture of goals and intentions.

RESULTS

An analysis of NRCS applied practices found that investments and structures associated with livestock distribution were implemented at much higher rates than other common investments on privately owned rangelands in the 17 US western states during 2004–2007 (Table 1). For example, between 2004 and 2007, prescribed grazing was implemented on almost 20 million hectares of land in the western United States with assistance from NRCS, while less than 150 000 hectares of prescribed burning was applied with NRCS assistance. The only exception was upland wildlife habitat management, where landowners develop management plans targeted toward supporting wildlife habitat, which was implemented on over 8 million ha.

An assessment of 2007 ranking sheets used to prioritize projects for the EQIP program further indicated that livestock distribution was the prioritized focus for range investments. For example, all ranking sheets in Wyoming, with one exception,

Table 1. Livestock distribution and other investments applied to rangelands in the 17 US western states through all Natural Resources Conservation Service (NRCS) programs from 2004 through 2007 (all values $\times 1000$).¹

Applied conservation practices	2004	2005	2006	2007	Total	Units
Livestock distribution						
Prescribed grazing	3 576	5 028	4 867	5 843	19 315	Hectare
Pipeline	2 842	4 206	4 911	4 359	11 958	Meter
Fence	1 918	2 791	4 554	4 018	9 263	Meter
Watering facility	26	54	47	10	127	No.
Other						
Upland wildlife habitat management	1 675	2 690	3 644	3 428	8 009	Hectare
Prescribed burning	40	62	34	54	136	Hectare
Use exclusion	5	27	14	29	46	Hectare
Wetland wildlife habitat management	5	7	5	9	17	Hectare
Streambank and shoreline protection	5	9	7	11	21	Meter
Pest management	150	137	328	588	614	Hectare
Brush management	182	213	276	290	671	Hectare
Range planting	18	19	20	31	57	Hectare
Windbreak/shelterbelt establishment	88	154	200	131	442	Meter

¹From USDA NRCS 2007d.

rewarded projects that proposed to install additional interior fencing and watering facilities. Another common goal was to incorporate growing season rest into the grazing plan (13 out of 21). The sheets encouraged this goal by rewarding the use of additional cross fencing and watering facilities to facilitate rotational grazing. Overall, ranking sheets awarded more points to applications that proposed to install more watering facilities closer together, reduce pasture size, and rotate livestock faster; our survey of ranking sheets in other western states suggested the same general pattern. Thus, our overall impression was that livestock distribution investments and associated structures, such as prescribed grazing, pipeline, fence, and watering facilities, were the highest priority for NRCS funding.

CSP spending also showed a strong focus on livestock distribution. Ninety-one percent of CSP spending for “grazing enhancements” across the 17 US western states was paid to private landowners for enhancements emphasizing livestock distribution (Table 2). Investments varied widely by state: Oklahoma allocated only 33% of its funding to livestock distribution, in contrast to North Dakota (100%), Utah (100%), Wyoming (100%), and Oregon (99%). Many CSP grazing enhancements paid significant incentives for implementing livestock distribution practices. For example, North Dakota paid \$2.47 per hectare to ranchers with three rotated pastures, \$3.71 per hectare for those with four pastures, steadily increasing up to \$11.12 per hectare for those with at least 10 pastures rotated.

We focused on grazing enhancement spending because these CSP grazing enhancements demonstrate NRCS’s vision of the environmental best practices for grazing management. As stated in CSP’s program description, enhancements are awarded for “exceptional conservation effort” (USDA NRCS 2005), in this case related to grazing management. CSP also provides incentives for “wildlife enhancements” that are funded separately from grazing enhancements but in some cases could be related to grazing management and could create incentives for grazing management investments unrelated to livestock distribution.

Spending for grazing enhancements, presented in Table 2, does not reflect spending on these wildlife enhancements. However, wildlife enhancements were not limited to rangeland, and we estimated that the amount of wildlife enhancement funding related to grazing management was small. We calculated that only 7% (\$2.3 million) of the CSP wildlife enhancement funding in these 17 states went to wildlife enhancements exclusively related to grazing management. This estimate was based on categorizing individual wildlife enhancements targeted exclusively at grazing management (e.g., defer grazing on sage grouse leks during nesting) and calculating their percentage of total of CSP wildlife enhancement spending in western US states.

DISCUSSION

Grassland birds and other wildlife in the 17 US western states are dependent largely on habitats found on privately owned rangelands managed for livestock production. It is widely recognized that managed livestock grazing can be a valuable wildlife habitat enhancement tool (e.g., Vavra 2005). In particular, a growing body of research indicates that mimicking historical disturbance patterns is critical for maintaining wildlife habitat in a wide variety of ecosystems (Tews et al. 2004; Askins et al. 2007). While not all species may benefit from small-scale heterogeneity (within pastures), many scientists, wildlife agencies, and bird conservation organizations recommend heterogeneity-promoting management for wildlife habitat enhancement (e.g., Wyoming Partners in Flight 2002; Pool and Austin 2006; Askins et al. 2007).

In contrast, analysis of the distribution of NRCS financial assistance for privately owned rangelands in 17 western US states between 2004 and 2007 suggests that enhancements related to livestock distribution are the practices most commonly implemented. Many state NRCS offices provide incentives for intensive rotational grazing systems that can create uniform grazing patterns (e.g., high-intensity short-

Table 2. Conservation Security Program (CSP) expenditures in 2005 for grazing enhancements for all western states. Spending was divided into two categories: 1) livestock distribution (high-intensity short-duration grazing, rotation of minerals or water, rotational grazing, increasing number of pastures, increasing number of watering facilities, riparian exclusion, rest rotation) and 2) other practices (pasture interseeding, brush management, management for wildlife, prescribed burning, use of decision support tools).

	CSP expenditures on grazing enhancements related to:			
	Livestock distribution		Other practices	
	Sum	% Total	Sum	% Total
Arizona	\$105 588	65%	\$57 667	35%
California	\$15 481	67%	\$7 525	33%
Colorado	\$643 582	95%	\$31 772	5%
Idaho	\$169 374	66%	\$86 312	34%
Kansas	\$1,399 830	86%	\$225 708	14%
Montana	\$489 718	89%	\$60 391	11%
Nebraska	\$122 964	81%	\$28 563	19%
Nevada	\$575	72%	\$224	28%
New Mexico	\$115 833	94%	\$7 800	6%
North Dakota	\$1 026 774	100%	\$1 800	0%
Oklahoma	\$117 702	33%	\$239 088	67%
Oregon	\$6 451 606	99%	\$70 298	1%
South Dakota	\$117 590	83%	\$24 104	17%
Texas	\$420 275	60%	\$283 126	40%
Utah	\$528 723	100%	\$0	0%
Washington	\$40 426	37%	\$67 766	63%
Wyoming	\$80 642	100%	\$0	0%
Total	\$11 846 683	91%	\$1 192 144	9%

duration grazing, intensive grazing, rotation grazing, increasing the number of pastures, and so on). If our assumption that these investments can diminish habitat heterogeneity is correct, then they could be working at cross-purposes with NRCS's goal of supporting wildlife habitat and healthy wildlife populations, including at-risk species.

In addition to potentially diminishing heterogeneity, adding structures like fencing and watering facilities to the landscape may have other direct and indirect negative impacts to wildlife. Over 9 000 km of fence and 127 000 watering facilities were installed on privately owned rangelands in these 17 US western states. There is evidence that fencing can result in wildlife mortality through direct collisions and facilitation of predation and can reduce habitat quality for area-sensitive birds by fragmenting habitats (Connelly et al. 2000; Freilich et al. 2003; Patten et al. 2005; Wolfe et al. 2007). Watering facilities for livestock can also negatively affect sage grouse habitats (Braun 2006) and kill birds that fall into them and cannot escape. It is unclear how many installed watering facilities contained wildlife-escape devices or how much fencing was "wildlife friendly." Artificial water sources can also be important to wildlife, especially big game species; however, little is known about whether most species of native wildlife benefit from watering facilities (Payne and Bryant 1994).

However, we recognize that livestock distribution is an important goal and concern on rangelands, especially in areas with topographical complexity (Ganskopp and Bohnert 2006; Bailey et al. 2008). Uneven distribution in these cases can cause

resource degradation (e.g., damage to riparian areas due to livestock congregation), and projects are often undertaken to address this problem. Thus, in certain geographical locations, an important balance must be struck between preventing resource degradation due to uneven livestock distribution and promoting heterogeneity that is important for biodiversity.

Livestock distribution-oriented investments and structures may also be applied in such a way that produces compositional and structural heterogeneity of vegetation among pastures. For example, a rest-rotation system that rests a pasture each year creates pastures with no grazing pressure and therefore promotes heterogeneity among pastures. It was impossible to discern how much of this among-pasture heterogeneity management was being promoted because we did not have access to project-level data. However, no Wyoming ranking sheets used the creation of among-pasture heterogeneity as a goal, and rest-rotation was even discouraged by the state's prescribed grazing standard, which stated that "complete year-long rest is generally not required to restore vigor to depleted grazing lands, and over time, can become detrimental to plant vigor and species composition" (USDA Wyoming NRCS 2008).

The apparent emphasis of NRCS spending and applied practices on management focused on livestock distribution may be partly the result of a perception that rotational grazing systems (especially high-intensity, short-duration systems) have wide-ranging production and environmental benefits. According to this perception, rotational grazing systems are therefore a win-win solution that is appealing to range managers, private landowners, and wildlife biologists alike. This perception persists despite substantial evidence that uniform grazing management can have negative consequences for ecosystem health (Fuhlendorf and Engle 2001). Conclusions from major reviews of grazing systems research spanning the past 50 yr have consistently shown that rotational grazing systems do not have animal or plant production benefits over continuous grazing (Van Poolen and Lacey 1979; Briske et al. 2008).

We found it encouraging that there was an emphasis on upland wildlife habitat management, an investment with the stated goal of improving habitat conditions for wildlife. Each state NRCS office sets its own specific goals for upland wildlife habitat management, so it is difficult to conclude what kind of management was applied in practice. In Wyoming, we found that this practice is often reported along with prescribed grazing when the latter has a perceived benefit to wildlife, even when no additional actions have been taken by the landowner other than prescribed grazing. Therefore, some of the hectares reported under upland wildlife habitat management may have applied only a prescribed grazing plan. It is unclear from the data how and when upland wildlife habitat management incentives were used in each state; however, if properly applied, they are an opportunity to provide financial incentives for heterogeneity-promoting management.

An important consideration is whether focusing project ranking and evaluation on the amount of environmental improvement, rather than the number of structures and management investments applied, would be better motivation for landowners to provide environmental benefits like healthy wildlife populations. Shifting the focus of ranking systems toward expected environmental outcomes instead of methods (e.g., structural items and management investments) could help

reduce use of unnecessary structures and avoid their negative and potential indirect impacts while encouraging other innovative ways to achieve environmental benefits. Despite the difficulty of monitoring environmental benefits, their assessment is important because they are the goal of NRCS conservation programs. The recently initiated Conservation Effects Assessment Project by NRCS is a significant step toward measuring and monitoring benefits at a broad scale, but finer-scale monitoring is also needed.

IMPLICATIONS

Collaborative efforts between rangeland and wildlife managers could bring forth management options that emphasize optimization of both livestock production and wildlife habitat objectives (Vavra 2005). Focusing conservation programs and financial assistance on maintaining or increasing compositional and structural heterogeneity of vegetation could be a unifying theme. Shifting the focus of conservation programs from structural items and management systems to anticipated ecosystem outcomes may lead to greater environmental stewardship, innovation, and conservation effects.

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