Assessing and Implementing Ranch Management Planning at Scale through the Matador Ranch Grassbank

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ABSTRACT
The Matador Ranch Grassbank is the most successful grassbank in the country, annually incentivizing conservation actions on over 200,000 acres of participating ranches. Incentives for management actions are in the form of discounts, which reduce the cost of leased grazing at the Matador Ranch. One of the required discounts for participating in the grassbank is a ranch management plan that guides grazing and benefits natural communities and the wildlife dependent upon them. This report details the results of our work to assess resource conditions and craft management plans with eight ranches on over 113,000 acres. Our analysis found that overall ranches implemented grazing management practices that maintained ecological condition that sustained healthy grasslands. Research results on grassland birds and grazing by Lipsey (2015) emphasized the importance of broad-scale outcomes versus incentivizing heterogeneity-driven grazing management practices on grassbank ranches. The most common management need on the ranches was changing season of use over time on native pastures and increasing utilization levels in crested wheatgrass pastures. Incentivizing these changes in the future will have corresponding positive outcomes for native habitats and wildlife.

INTRODUCTION

Globally, temperate grasslands are the least protected and most altered of all major habitats (Hoekstra et al. 2005). From 1983 to 2007, about 25 million acres of grassland in the U.S. were converted to other uses, primarily cropland (GAO 2007). As a result of this catastrophic loss of habitat, several formerly wide-ranging species have been under consideration for protection by the Endangered Species Act. Mountain Plover, Sprague's Pipit, Greater Sage-grouse (Sage-grouse), and black-tailed prairie dog (prairie dog) are among the species at greatest risk, while a suite of endemic grassland birds, including Baird's Sparrow, Chestnut-collared Longspur, and McCown's Longspur are suffering the steepest and most universal declines of any bird assemblage on the continent (Knopf 1996, NABCI US Committee 2009).

Expansive areas of grassland habitat remain in portions of eastern Montana, and most of that acreage is utilized for livestock production. While the habitat is essential intact, grazing management may substantially affect habitat suitability for grassland birds (Knopf 1996). It has

been hypothesized that the commonly prescribed, moderate utilization and uniformly distributed grazing has negatively impacted grassland species by reducing structural diversity and hence habitat availability for some species (Fuhlendorf and Engle 2001). To ensure suitable habitat is available for all species, management that results in more heterogeneous vegetation structure has been recommended (Derner et al. 2009, Toombs et al. 2010, Freese et al. 2014). Common ranch infrastructure utilized to manage grazing (e.g. pasture fences) may also have negative consequences for wildlife. Fences can act as semi-permeable barriers through most of the year but in some cases (based on fence type and season) can act as complete barriers to ungulate movement, especially for pronghorn (Tufford 1960, Harrington and Conover 2006, Harris 2009). Because pronghorn do not regularly jump fences, it is important for fences to be constructed in a "wildlife friendly manner" thus allowing movement underneath fences. Fences may also be a source of significant Sage-grouse mortality (Christiansen 2009). During the mating season, Sage-grouse have been found to collide with fences within ½ mile of leks, especially where terrain is level near the lek.

The Conservancy believed it could make a positive impact addressing grassland conservation issues around grassland birds, Sage-grouse, and other declining species, through its purchase of the Matador Ranch in 2000. The 60,000 acre ranch was acquired based on its central location within expansive intact habitat and outstanding ecological values, however, the scale at which many of the priority species operate within the landscape limited our ability to create a conservation impact. In 2003, the Matador Ranch Grassbank (grassbank) was launched as an innovative tool designed to engage the local community and grow trust and credibility to build conservation outcomes beyond the ranch's boundaries. The grassbank functions by providing

ranchers access to discounted forage on the Matador in exchange for conservation actions, referred to as "discounts", on their own ranches in Phillips County. The grassbank has grown into the largest and most successful in the country, working on average with at least 10 ranch operations to secure discounts on 200,000 to 250,000 acres per year. The incentives have focused on ecological outcomes that provide short-term protection of habitat (e.g. prohibit sod busting native vegetation), reward retention of habitat for declining species (e.g. black-tailed prairie dog colonies), and encourage management practices that produce habitat for species of concern. Management practices on ranches are largely covered by the ranch planning discount. The discount requires that each ranch have a plan containing the following elements: "1) Among the pastures dominated by native vegetation, in total they are stocked approximately at carrying capacity as defined by the NRCS estimated production or actual pasture-based data. Variable utilization (rather than uniform utilization) over time is desired. 2) Rotational grazing is employed that ensures native pastures are not grazed consistently at the same time each year during the growing season (May thru September)".

The purpose of this project was three-fold. One, create written ranch management plans for all of the grassbank ranches. Prior to this effort, some of the ranches had developed plans through *Undaunted Stewardship*, a program supported by the Montana Extension Service, but several did not. Two, determine if management needs existed on the ranches. Three, working with ranch owners, develop future discounts to address management needs. The final purpose was viewed as especially important for launching a discount that would apply research results for grassland birds. More specifically, we anticipated that research conducted by Lipsey, with support from the Plains and Prairie Pothole LCC, Bureau of Land Management (BLM), and The Nature

Conservancy (Conservancy), would provide information on factors that impact the distribution of grassland birds at various scales in the north central Montana.

METHODS

We conducted ranch planning with six ranches beginning in 2013 and two more ranches were added in 2014 (Figure 1). Two other ranches in the grassbank had existing whole ranch plans with the Natural Resources Conservation Service (NRCS), and were not included in the planning effort as the existing documents were considered to be sufficient for meeting the discount purpose.

Ranch planning relied heavily on guidelines developed in the northern Great Plains (Gates et al. 2007, Harmon 1999), as well as application of selected NRCS planning tools (NRCS 2010). Planning was initiated by meeting with ranch owners to collect information about their management goals and documenting details of their ranch operation, including the location of ranch infrastructure (fences and livestock water), number and class of livestock and the approximate dates and locations on the ranch throughout the year, and management activities related to the land or livestock.

After initial data collection, fences (pastures) and livestock water spatial data layers were created in a GIS for each ranch. Satellite imagery was then used to delineate vegetation (native, tamegrass, hay, and crop). Next, digitized NRCS soils data for Phillips County was used to identify ecological sites, and acreage for each was calculated by pasture. Also, existing spatial data for focal wildlife species were compiled from various sources, including Greater Sage-

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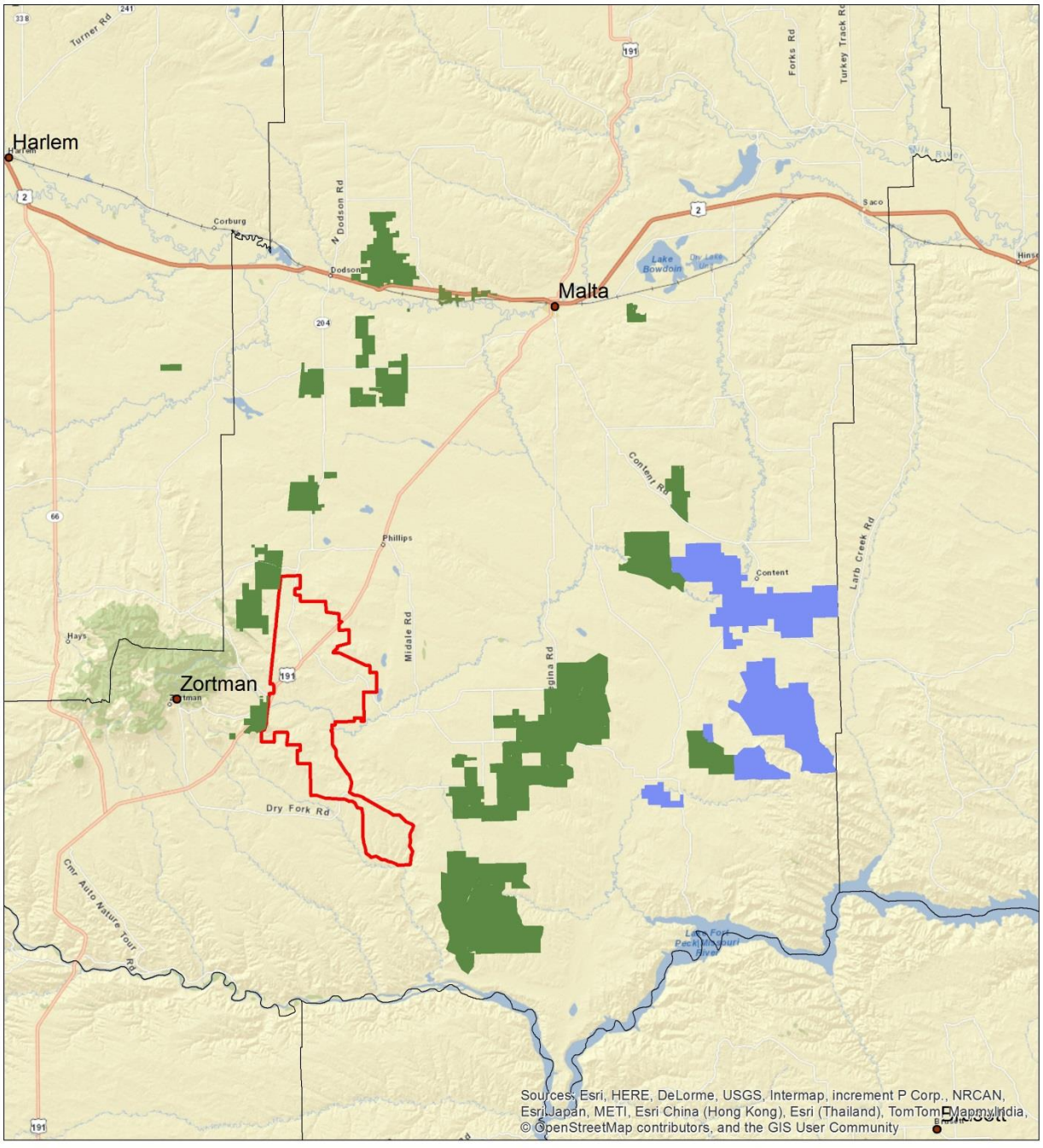
Figure 1. Matador Ranch and Grassbank Member Ranch Planning 2013-2014



grouse leks (Montana Fish, Wildlife and Parks), grassland birds (TNC and independent research data), prairie dog colonies (TNC and tribal data), pronghorn migration corridors (independent research data), and other rare species (Montana Natural Heritage Program).

Once baseline vegetation maps had been created and confirmed, field data was collected to determine the ecological condition of native plant communities on private land (Caudle et al. 2013). Because of the size of the ranches, sampling was limited to pastures that had relatively high forage production potential, as grazing impacts are often most pronounced on these sites and they were most likely to serve as habitat for species of concern. In 2013 and 2014, a contractor was hired to determine plant species composition using weight estimate sampling (Hilmon 1959, Wilm et al. 1944). A minimum of ten plots were sampled from each ecological site. Additionally, at each sampling site percent dead (proportion of the total weight of the quadrat sample comprised of standing or lightly lodged dead plants) and percent ground-surface cover was collected and photo points were established. Data were then compiled for each site and ecological condition was determined using NRCS ecological site condition guides (McGinty and White 2014). The numerical score from each ecological site was used to place it within one of four categories, excellent, good, fair, and poor.

Ecological sites were also used as the foundation for calculating carrying capacity for native pastures on each ranch. NRCS has established recommended stocking rates for every ecological site by county. We validated the stocking rates in southern Phillips County by comparing them against long-term stocking on the Matador Ranch and BLM allotment permits on some of the ranches. Acreage by ecological site within a pasture was used to generate carrying capacity. We

then compared carrying capacity with forage demand to determine if a ranch met stocking rate guidelines within native pastures. Condition score of an ecological site was also considered, as sites in good to excellent condition are considered capable of supporting the recommended stock rate, whereas fair condition sites may require a reduction in stocking as a means of improving condition.

In addition to ecological health of natural communities, we evaluated ranches based on the presence/absence of expected grassland birds and Sage-grouse by using recent monitoring data. We also examined potential mortality of Sage-grouse caused by collisions with fences near leks. We overlaid Conservancy developed fence spatial layers for each ranch with NRCS generated collision risk potential around each known lek. Fences with a high risk for collision were identified. We also collected information on the configuration of east-west running fences located within pronghorn migration corridors in an effort to identify potential barriers to migration.

RESULTS

Ranch plans were developed for eight grassbank ranches (Appendix A). In total, these ranches encompassed 113,615 acres, which included private and public lands. For each of the ranches we evaluated current management against the ranch planning conservation discount requirements of stocking within carrying capacity and implementation of rotational grazing for native pastures. Compliance of ranch infrastructure for the Sage-grouse discount was also determined and potential future discounts, based on management needs and interests of ranch owners were noted.

Livestock forage demand on native rangeland was found to be at or below carrying capacity on all eight ranches (Table 1). In general, the larger ranches have greater flexibility in stocking rates within and between pastures, whereas smaller operations have fewer management options and basically stock to carrying capacity and either feed hay or lease other grass. The smaller operations have far fewer options during drought.

Proper stocking was reflected in the ecological condition of native pastures. Of the 55 ecological sites inventoried in native pastures, 43 (78%) were found to be in good to excellent condition and 12 (22%) were in fair condition. There were no ecological sites in poor condition that were considered to be native vegetation. Sites in fair condition most often had a relatively high cover of crested wheatgrass, an exotic pasture grass that aggressively invades native communities (Christian, J. M. and S. D. Wilson. 1999, Henderson and Naeth. 2005). Invasion was usually from an adjoining crested wheatgrass planting and in some cases the pasture sampled or portions of it may have been farmed and seeded to crested wheatgrass in the past. Some fair condition sites appeared to have been over-stocked in the past, which was more common on the smaller operations. All of these sites appeared to be recovering, which has likely been facilitated by abundant moisture since 2008, as well as, grazing opportunities at the Matador Ranch. A quick review of summary data for BLM allotments associated with five of the eight ranches found that all but one allotment fully met BLM's Range Health Standards, and that the one allotment that did not was the result of BLM not completing monitoring (PEER 2014).

Table 1. Planning Summary Results for Eight Grassbank Ranches.								
	Carrying Capacity and Stocking Rate							
Ranch Number	1	2	3	4	5	6	7	8
Plan Acres	657	10,128	23,157	35,007	10,145	22,512	1,550	10,107
Native Pasture AUMs Forage Need	125	750	2,074	6,970[1]	1,725	2,800	288	2,070
NRCS Recommended Stocking (AUMs)	125	1,508	2,107	7,384[1]	1,944	2,975	288	2,769
	Ecological Condition on Private Land and Standards Met on BLM Leases							
Ecological Condition Sample Locations	2	6	7	6	7	9	7	11
Excellent	0	0	0	0	0	1	0	0
Good	2	6	6	4	7	5	3	9
Fair	0	0	1	2	0	3	4	2
BLM Allotments	0	2	5	6	1	2	0	0
Met	N/A	1	5	6	1	2	N/A	N/A
Not Met - Insufficient Information	N/A	1	0	0	0	0	N/A	N/A
Rotational Grazing (Y/N)	Y	Y	Y	Y	Y	Y	Y	Y
	Ranch Infrastructure and Wildlife Management							
Acres of Sage-grouse Habitat Private Land	0	2,377	5,286	14,520	3,947	3,928	0	0
Fences Marked in Areas of High Collision Risk	N/A	Y	Y	Y	No lek collision models	N	N/A	N/A
Prairie Dog Acres	0	0	262	529	87	173	0	174
Wildlife-Friendly Fence Modifications for Pronghorn	Y	Y	Y	Y	N	N	N	Y

1. Includes tamegrass pastures.

All of the ranches utilize rotational grazing. Complexity of rotation was directly related to the size of the ranch operation in both acres and livestock. The smallest ranches rotated cattle between a few pastures and during a limited portion of the grazing season. The larger ranches rotated multiple herds of cattle through dozens or more pastures throughout the year. Ranches are inconsistent in changing season of use of native pastures between years. Most common reasons cited for not changing season, included water availability, BLM grazing allotment management plan requirements, and weather. The larger ranches have native pastures that are designated as "winter" pastures, which are grazed without supplemental hay during open winter months from December through mid-March. During extended severe winter weather all of the ranches concentrate livestock on tamegrass pastures close to shelter and building sites where hay is fed. Hay is also fed in mostly tamegrass pastures during calving season, which begins in about mid-March and ends around late-April.

Ranch infrastructure varies widely among the ranches. As in most ranch operations, fences tend to be old and location and resulting pasture configuration reflects a blend of historic ownership patterns and range management considerations, including implementing rotational grazing and riparian management. Fences and risk of collision for Sage-grouse were evaluated for every lek within the planning area. Of the five ranches with Sage-grouse habitat, three of four had markers installed on their fences where there was a moderate to high collision risk, while another had suitable habitat, but no leks were proximate to fences. In regard to pronghorn, five of the eight ranches have participated in improving passage by removing fence or changing fence configurations to meet wildlife-friendly standards.

DISCUSSION

For this project we wanted to first determine if ranch owners were implementing grazing management to sustain healthy rangelands, and second, if there were practices we could encourage that would correct management deficiencies through development of new grassbank discounts, especially for grassland birds. We found that ranches associated with the Matador Grassbank employ conventional best management practices, including stocking within carrying capacity and implementing rotational grazing on native pastures. In conversations with the ranch owners, all expressed an expectation of employing prescribed grazing on their ranches. There appears to be two contributing factors for the consistent use of best management practices in this area. First, properties are managed for livestock production and owners view themselves as ranchers, with a responsibility and pride in good grazing land stewardship. They identify healthy rangelands as a requirement for sustainable livestock production and express a stewardship responsibility for wildlife, including providing habitat and reducing unintended mortality from ranch operations. Second, the BLM appears to have had a major influence in adaptation of best management practices on ranches with allotments. BLM's rangeland management prescriptions impacted operations of five of the ranches, because of mixed deeded and public ownership. Allotment management plans developed by the BLM and implemented by the ranches have established pasture stocking levels for public and private land, and historically, BLM provided funding to develop stock water and fences that allowed for implementation of rotational grazing. These long-standing experiences contributed to landowner knowledge of range management principles.

Grazing management can have dramatic impacts on habitat availability for grassland birds (Lipsey 2015). Fuhlendorf and Engle (2001) hypothesized that relatively consistent, moderate grazing intensities, such as those used by grassbank members, result in homogeneous grazing patterns and are likely driving declines of some grassland birds. Results of that hypothesis have called into question conventional grazing management and the need for a new heterogeneity-based paradigm (Toombs et al. 2010, Freese et al. 2014). Lipsey (2015) confirmed that grazing intensity can significantly alter habitat structure and bird distribution between years at local scales. However, when she examined predicted distribution of grassland birds at large-scales, which other authors have failed to do, she found that precipitation and the intrinsic soil productivity of a site were the driving factors in determining habitat suitability for the full suite of grassland birds. Her recommendation was that conservationists should consider grazing within the context of environmental constraints and that the value of habitat amount far outweighed that of heterogeneity.

Lipsey's results have profoundly impacted our consideration of future discount development associated with grassland birds and the Matador Ranch. Monitoring at the Matador and grassbank ranches confirm the grassland bird distribution at-scale reported by Lipsey. The more mesic and productive Matador Ranch has consistently supported more high residual cover birds (e.g. Sprague's Pipit and Baird's Sparrow), whereas as species that require lower structure (e.g. Chestnut-collared Longspur) are more abundant on drier grassbank ranches with less productive soils (The Nature Conservancy unpublished data, Lipsey and Drietz 2014). These results suggest that discounts focused on management incentives to produce higher residual cover at the scale of grassbank member pastures or ranches would be misplaced and ineffective.

In our analysis, the most common opportunities for changes in ranch management were mostly associated with better utilization of crested wheatgrass pastures and increased use of wildlife-friendly fence modifications. Crested wheatgrass, an introduced pasture grass, provides high quality, spring to early summer forage and is resilient to high utilization when compared to most native grasses. Crested wheatgrass has mostly been planted because it was easy to establish on marginal cropland and traditionally it has been used as an early forage source. Incentives associated with crested wheatgrass should focus on extending the season of use to mid-June, rather than the typical early spring grazing period (April through mid-May). Extending the season of use will benefit native pastures by limiting exposure of native grasses during active growth when they are the most sensitive to grazing. Incentives should also work to increase utilization to at least 65% of annual production. Higher levels of utilization of crested wheatgrass will suppress flowing, and consequently limit seed production and its aggressive spread into adjoining native vegetation. Incentives may also have to account for cost-sharing infrastructure (fence and water) required in order to implement management.

There is also an opportunity to incentivize additional infrastructure changes that are directed at reducing impacts to wildlife. The biggest need is in continued modification of fences for pronghorn passage. Ranches within the primary pronghorn migration corridors, as identified by Jakes (pers. comm.), have mostly modified their east-west running fences, so that north-south passage during migration was easier. On some of those ranches north-south fences may remain as barriers for resident animals. Modifications for resident pronghorn would also be beneficial on those ranches outside of the migration corridors. On-going research at the Matador and in

Alberta is testing low-cost modification of fences for pronghorn passage. Application of the incentive would require locating barriers and passage areas where modifications will enhance movement.

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