

**Southeastern Colorado
Survey of Critical Biological Resources:
Landowner's Guide to Livestock and Biodiversity**

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Introduction

Southeastern Colorado Survey of Critical Biological Resources

The Colorado Natural Heritage Program (CNHP) works to survey the critical biological resources of Colorado counties and other land within the state. In the summers of 2007 and 2009 a survey was conducted in southeast Colorado to contribute to the overall CNHP effort. This Southeastern Colorado Survey of Critical Biological Resources (the "Southeast Biological Inventory") was intended to: 1.) identify the location of high quality examples of plant and animal communities on CNHP's list of rare and imperiled elements of biodiversity existing in the area; 2.) to assess the conservation value of those elemental occurrences, and; 3.) to systematically define and prioritize Potential Conservation Areas (PCA) that may be used for effective conservation action.

The 2007 Southeast Biological Survey primarily focused on the canyon country on the east and south side of the study area. Due to the little emphasis on the grasslands, local landowners, CCALT, and Great Outdoors Colorado (GOCO) requested that CNHP conduct a second field season of inventory. In 2009 the second field season took place on the west and north side of the study area and was reported as an addendum to the original report. The results of the addendum are invaluable to the local landowners and expand the body of scientific information of the biodiversity conservation value the properties provide.



Figure 1. Location of Southeast Colorado Project Area.

The content of this companion piece is targeted at landowners and managers to achieve production goals without compromising biodiversity conservation by understanding key processes and being able to identify key indicator species. The companion piece will also allow landowners to identify and maintain areas that may qualify for a payment for ecosystem services program. The data compiled in the inventory is extremely valuable and would be best utilized by individuals performing "on the ground" management of the properties. However, scientific documents tend to be large, intimidating, complicated documents that take care in being unbiased and also relatively inaccessible to the typical land manager. We took this information and compared the results with the management practices taking place to better understand which management actions are compatible.

Landowner guide to livestock and biodiversity

The study area of the Southeast Biological Inventory harbors the largest intact working landscape remaining not only on Colorado's eastern plains, but also in the entire Central Shortgrass Prairie ecoregion (see figure 2.). Approximately 80% of the study area is under private ownership with 3% under conservation easement. Overall, the condition of the biological resources in the study area is excellent. This speaks volumes to the type and quality of land management occurring in the area. Not only are the ranching operations continuing to support their families and the community with a valuable economic and food resource they are supporting a healthy ecosystem.

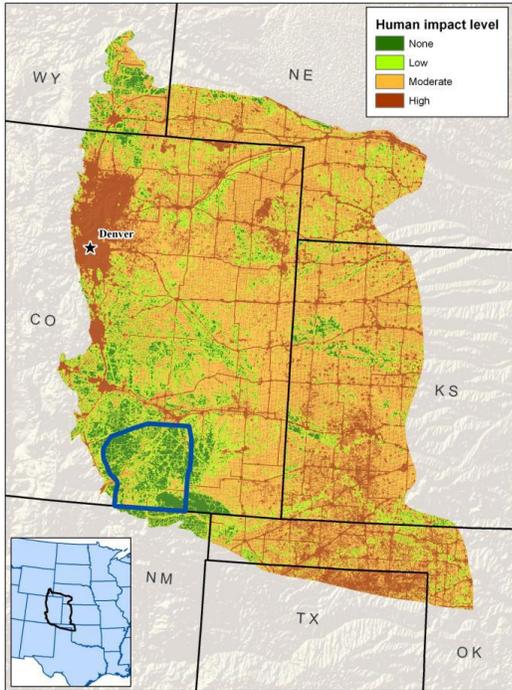


Figure 2. The human footprint or impacts on the Central Shortgrass Prairie ecoregion (modified from Neely et al. 2006). The blue polygon is the southeast Colorado study area (2.3 million acres).

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The landscape located within and surrounding the study area provides an array of services that benefit the landowner's, immediate communities, residents of Colorado, and tourism. These lands provide natural ecosystem resources or ecosystems services including clean water, food, wildlife habitat, flood control, and erosion control, among others. By identifying these resources and ensuring their quality with compatible

management practices many groups and economies will benefit. Funding provided by Natural Resource Conservation Service has made it possible to examine

the management practices taking place in these areas. Through interviews and documentation the Colorado Cattlemen's Agricultural Land Trust (CCALT) identified the land management practices in the area that are compatible and incompatible with biodiversity conservation goals.

CCALT, along with the Colorado Natural Heritage Program (CNHP), have identified six ecological systems that are located on and managed by landowners within the study area: 1.) Cliff; 2.) Grassland; 3.) Prairie Shrubland; 4.) Riparian, Wetland, and Aquatic System; 5.) Shale Hill, Barren, and Escarpment and; 6.) Woodland, Savanna, and Foothills Shrubland. Indicator species have been identified within each of the habitats to enable landowners to monitor biodiversity health of their property relatively easily. Indicator species are used in many different circumstances to gauge the ecological health and habitat condition of large complex systems. Abundance or lack of abundance, presence or lack of presence can indicate whether management practices are compatible with conservation strategies. By identifying the indicators and closely monitoring, landowners will also identify opportunities for different management or ecosystem services.

CNHP Systems and Associated Indicators

Cliff System

Cliff habitats are characterized by steep slopes and rocky conditions and offer important habitat for peregrine falcon, Townsend's big-eared bat and a variety of plant species. In most cases management of these areas are nonexistent due to the terrain, but are affected by outside forces. Groundwater seepage creates the most unique habitat for this area and supports a wide array of ferns which in turn can tell the landowner a great deal about the state of ground water resources. These areas need to be identified and can be monitored easily with set photopoints.

Grassland System

The dominant ecological system in the area is the Shortgrass Prairie and most relied on by ranchers for grazing. One of the most important grasses within the system utilized by ranchers and wildlife is the blue grama. Blue grama is a resilient species but if tilled or disturbed at the root level it is extremely hard to regenerate. Blue grama should be closely monitored and given a rest period when needed. Another key species when monitoring range condition is the New Mexico feathergrass. Similar to blue grama, this species needs a rest period to remain healthy year after year but cannot tolerate the same amount of grazing pressure. This species is easy to identify and is a well utilized grass by livestock and wildlife. Persistent healthy communities of New Mexico feathergrass and blue grama are a good sign of compatible grazing practices and when managed properly will be beneficial to ranching operations productivity.

Within in this system can be species acting as negative indicators, which will degrade the landscape and productivity of the land. Snakeweed will establish itself following drought periods or if grazing is incompatible. Snakeweed is not palatable to cattle and can lower pasture productivity at a large scale by 30%-50%. With the use of fire as a management tool beneficial species will reestablish themselves and increase productivity. Blue grama will outcompete snakeweed for resources if the area is intermixed with a healthy well managed population. During dry periods a land manager should focus on grazing areas where blue grama or galleta grass is the dominant species to allow the other grasses rest. Cheatgrass is another species that should be managed immediately when identified. Cheatgrass can overtake native grasses and cause serious harm to a landowner's productivity. Intense grazing of cheatgrass, when it is palatable, early in growing season, will reduce spread and allow more beneficial grasses to establish.

Wildlife indicators are also tied to compatible grazing practices and healthy ecosystems. The swift fox is closely tied to blue grama and is a good sign that the land is working well with the uses of the operation. An important species for biodiversity in Colorado is the black tailed prairie dog. Prairie dog towns support many other species by providing open habitat, nest sites, and shelter and by acting as a food supply for raptors and other predators. The prairie dog has

historically been seen as an incompatible species with grazing operations due to grazing competition or fear of injury. Many landowners' hold deep beliefs on management of prairie dogs and the decision is ultimately up to the landowner to make. However, there may also be emerging opportunities for ecosystem services with this species. These ecosystem services are discussed later in this document.

Prairie Shrubland System

The prairie shrubland is generally intermixed with the grassland and can be hard to delineate specific boundaries. Species that indicate a healthy shrubland include the Cassin's sparrow and curve-billed thrasher. The southern plains woodrat is also a species of concern and is associated with a healthy ecosystem. These mammals are hard to spot but evidence of their nests, located at the base of cholla cactus, are a good indicator of either their presence or the presence of their close relative the southern plains woodrat. One of the most important shrubs in the area for grazing is the four winged saltbush. This species is extremely important to soil erosion, wildlife, and cattle. Four winged saltbush establishes itself in gullies and washes and holds soils during rain events and can be utilized by cattle and wildlife during winter events. Historically this shrub was monitored very closely by ranchers to determine the health of the range. Further research or management must be done to determine how to disturb the shrub to keep from becoming too woody.

Riparian, Wetlands, and Aquatic System

Riparian areas/wetlands are important to agricultural management for many different reasons. Wetland areas irrigate, provide water to cattle, and serve as a unique habitat for Colorado wildlife. The plains leopard frogs can be used as a good indicator of compatible land management in the same way ferns located in the cliff habitat indicate a healthy system. Bullfrogs have been introduced to the area and can severely degrade the biodiversity of wetlands. Bullfrogs are ferocious predators and will prey on frogs and fish within the area. If bullfrogs are found in an area they should absolutely be eliminated.

Negative indicators have been identified in the wetlands habitat. Major problems with the invasive species tamarisk and cheatgrass have been identified in the area. Tamarisk and cheatgrass are extremely competitive and will use water resources quickly. Goats have been used to graze tamarisk but will select and prefer willows which may cause a management issue. Cheatgrass can be managed with intense grazing when it is green early in the growing season. Holding ponds located above wetlands can potentially cause changes in the stream systems. Ponds that are in use can potentially attract amphibians and provide habitat but can also facilitate the spread of weeds. These areas should be closely monitored for any increase in weeds and use. Holding ponds that are no longer needed should be re-graded and re-seeded to improve wetland habitat.

Shale Hills, Escarpments, and Cedar Breaks System

This system is extremely unique and offers habitat for rare plant species that otherwise would not have suitable habitat. This area often has a high occurrence of fossils and rare geologic features. The first step in management of these areas is to identify them and monitor frequently, as they are not well known as a unique community by many land managers. Often these areas have suitable grazing and can be utilized. This system is more sensitive to incompatible grazing than the adjacent shortgrass prairie and should have an abundance of bunch grasses, especially New Mexico feathergrass and Indian ricegrass, both considered a good indicator of a healthy system. If water is available to be pumped into these areas regular grazing practices can take place. Ranchers have also utilized these areas without degrading them by placing water tanks a distance away to control the time spent grazing in the area. Identifying and educating landowners is a key to properly managing these areas, along with mapping and periodic monitoring.

Woodland, Savanna, and Foothills Shrubland System

Woodlands in the area are primarily dominated by juniper. These areas can be used for grass production when younger junipers are controlled. Old growth junipers tend to occur in narrow strips of 100 meters or less, mostly on rims of the canyons and steeper slopes. Younger junipers have steadily been moving into the grassland where soil is deeper and seedlings can establish easily. These areas can be controlled by fire to keep the area in grass production where applicable. As junipers establish on hill sides and slopes, water is utilized by the trees before reaching the more economically important grasslands. A mosaic of tree/shrub/grass is most beneficial to the biologic community and will likely vary through time as the area is influenced by fire, drought, and grazing. Indicators of a healthy system are bird species including Rufus-crowned sparrow and the gray vireo. These species both need low junipers and shrubs for nesting and the grasses for foraging, hunting insects, and nest material. Large mammal species important to Colorado tourism and recreation such as bighorn sheep, elk, and mule deer are connected to this community. A healthy juniper/New Mexico feathergrass community also indicates compatible grazing practices and a healthy system. New Mexico feathergrass is important forage for ranching operations and as the woodland is managed for a healthy mosaic the land will provide valuable resources for the ranch as well as support ecosystem services.

Pinyon Canyon Maneuver Site

The Pinyon Canyon Maneuver Site (PCMS) provides an opportunity to compare the effects on biological systems within a large area where active management has been deliberately removed. Only when mechanized training activity resulted in damage to plant and soil systems was restoration utilized and was comprised mainly of reseeding and covering of ruts left by heavy equipment. The same indicators can be used for the same habitat types located in the PCMS though there are some differences. To date, no scientific study has purposely designed and executed a study to discern the differences between PCMS and neighboring lands however this

study would be worthwhile and could provide valuable insight as to the differences in biodiversity values. Meanwhile, anecdotal evidence suggests that biodiversity, especially the bird community, will differ between grasslands that are grazed (off PCMS) and grassland that are ungrazed (PCMS).

Historically the area has been grazed by various wildlife and cattle. Grazing is considered an essential part of the Southeastern Colorado ecosystem and the species located in the area rely on the mosaic that it produces. It should be no surprise that the quality of grasslands located on private lands may differ from a biodiversity conservation perspective. Grasslands located on the PCMS have not been intentionally grazed since 1983 but have been used for mechanized training (e.g. tanks) and dismantled activity. The reduction in grazing changes the structure of the grassland and supports a different suite of bird species than the grazed grassland. It is well-known that the mountain plover prefers heavily grazed areas, and ideally areas grazed by cattle and prairie dogs. PCMS has known occurrences of mountain plovers but they are only associated with areas with prairie dogs. The mechanized training is very destructive to the blue grama and will most likely take decades to restore and prevent weed establishment. The dismantled activity of training on foot and creating bivouac sites may also promote the spread of weeds within the grasslands.

Wetlands located on the PCMS did exhibit better quality compared to the private lands. This is primarily due to the unutilized water resources i.e. holding ponds created above drainages. Wetlands are very resilient and with management, restoration efforts, and monitoring, private lands can be restored relatively quickly.

Strategies

The results of the Southeastern Colorado survey of biological resources justifies landowners longstanding management and offers landowners a way of seeing the importance of compatible grazing management. Management that is beneficial to biodiversity is often connected to productivity and viability of the private land. By developing this companion piece to the survey CCALT hopes to make the results of the survey more accessible and pertinent to private land management.

Steps have been developed to help guide landowner's strategies in meeting conservation goals of their land.

1. *Use the information in the report to identify similar habitat types and indicator species.*
The information in the original report can be overwhelming but offers a place to start when identifying species of importance or elemental occurrences. This report picks out the pieces of information important and most relevant to landowners. It is important to note that the absence of an elemental occurrence in the report does not mean the species is not present. The survey took place over a relatively short period of time and covered an enormous

amount of area, species can be missed. By identifying the indicator species a landowner can begin to more easily recognize the biological condition of the property.

2. *Locate and establish areas of management need.*

As areas of opportunity are identified refer to this report to guide management decisions. Identify troubled areas and review techniques used to control or restore to a more natural community. Some areas may be difficult to manage and the disturbance to the land may not be related to the management taking place. In these cases the landowner should manage the factors based on the capacity of the land. This can include grazing species more resilient in drought conditions, giving longer rest periods for grasses, etc...

3. *Monitor indicator species.*

Become familiar with the key species and how they can be utilized. The indicator species are usually easy to identify and will help the landowner quickly see the compatibility of the grazing practices. Change may come slowly but in the end will promote a healthier landscape and a viable grazing operation. Many organizations have published monitoring plans and strategies to help landowners with working landscapes monitor properties. Listed below are publications and links to access the articles from the internet. This may help pave the way for a monitoring plan.

Riparian Health Assessment Method for Rangelands
californiarangeland.ucdavis.edu/Publications%20pdf/8089HR.pdf

Guidelines for Monitoring the Establishment of Riparian Grazing System
californiarangeland.ucdavis.edu/Publications%20pdf/8094Guide%20rip%20grz%20sys.pdf

Rangeland Monitoring Manual
www.uwyo.edu/ces/PUBS/B1065.pdf

How to Monitor Rangeland Resources
www.sarep.ucdavis.edu/NEWSLTR/v8n1/sa-12.htm

4. *Develop priorities for ecosystem services opportunities*

Payment for ecosystem service (PES) programs have been emerging as a way of monetarily compensating landowners for management practices that protect an area's biodiversity, watershed, soil fertility, and other natural resources. By developing a PES program landowners will have greater incentive and/or be rewarded for their exemplary land stewardship. Further research needs to be done to take the next step in creating a reimbursement system and developing a program available in the future.

Appendix A. Indicator Species Tables

Table 1. Grassland

Species	Significance to Biodiversity	Significance to Agriculture	Image
Blue Grama	Utilized by many species, large healthy populations indicates healthy system	Can be grazed during winter and dry periods as well as any other time, resilient as long as roots are not disturbed	 A photograph of a Blue Grama grass plant with several upright stems and a dense base of blades.
New Mexico Feathergrass	Utilized by many species, large healthy populations indicates healthy system	Can be grazed in either spring or fall as long as a rest is built into the grazing cycle	 A photograph of New Mexico Feathergrass with long, thin, arching blades.
Snakeweed	Can overpopulate areas, provides little browse for game species, increaser species under drought conditions or incompatible management practices	Cannot be utilized by domestic livestock, indicates high utilization grazing previous to and during drought periods.	 A photograph of a person's hands holding a Snakeweed plant with small yellow flowers against a blue sky.
Cheatgrass	Invasive species, displaces native grasses	Poor quality forage, displaces native grasses, severely reduces grazing potential	 A close-up photograph of Cheatgrass seed heads with long, awn-like structures.

Southeastern Colorado Landowner's Guide to Livestock and Biodiversity

<p>Cholla</p>	<p>Often associated with blue grama, can protect native grasses, provides habitat for woodrat</p>	<p>Blue grama usually located in area of Cholla and can be utilized by livestock</p>	
<p>Black Tailed Prairie Dogs</p>	<p>Presence indicates healthy system, burrows provide habitat for a host of other wildlife, their grazing creates open habitats preferred by Mountain Plovers</p>	<p>Creates conflicts with grazing users, may be a source of environmental amenity income in the future</p>	
<p>Swift Fox</p>	<p>Presence indicates healthy system, often associated with blue grama</p>	<p>Indicates functioning grassland system/healthy blue grama population, easily noted</p>	

Southeastern Colorado Landowner's Guide to Livestock and Biodiversity

Table 2. *Prairie Shrubland*

Species	Significance to Biodiversity	Significance to agriculture	Image
Cassin's Sparrow	Declining prairie species, presence indicates healthy system	Presence indicates compatible grazing management	
Curve-billed Thrasher	Declining prairie species, presence indicates healthy system	Presence indicates compatible grazing management	
Southern Plains Woodrat	Declining prairie species, indicates healthy system,	Presence indicates compatible grazing management	
Fourwing Saltbush	Promote infiltration of rainwater, prevent excessive erosion, utilized by large game	Promote infiltration of rainwater, prevent excessive erosion, can be utilized by cattle	

Table 3. Riparian, Wetland, and Aquatic Systems

Species	Significance to Biodiversity	Significance to agriculture	Image
Plains Leopard Frog	Indicates the hydrologic integrity of the canyon is intact	Indicator of compatible practices	
Cottonwood	Active regeneration indicates the hydrologic integrity of the canyon is intact and compatible grazing regimes are in existence. Natural floods, especially when cotton is flying, is key to successful sprouting	Important cover for livestock in storms, provides shade	
Tamarisk	Invasive species, displaces native vegetation, can choke streams by encroaching into them and collecting debris	Displaces native vegetation, creates barriers to water source, uptakes large amounts of water, increases saline content of soils and water.	
Cheatgrass	Invasive species, displaces native grasses	Poor quality forage, displaces native grasses, severely reduces grazing potential	
Bullfrog	Feeds on native wildlife including frogs and fish	Indicator of incompatible practices	

Southeastern Colorado Landowner's Guide to Livestock and Biodiversity

Table 4. Woodlands, Savannas, and Foothill Shrublands

Species	Significance to Biodiversity	Significance to agriculture	Image
Rufous-Crowned Sparrow	Presence indicates healthy system	Presence indicates compatible grazing management	
Gray Vireo	Presence indicates healthy system	Presence indicates compatible grazing management	
Juniper/Feathergrass Community	Supports a host of species, utilized by large game	Feathergrass is utilized by cattle, control of juniper may be necessary with fire	

Table 5. Shale Hills, Barrens, and Escarpments

Species	Significance to Biodiversity	Significance to agriculture	Image
New Mexico Feathergrass	Utilized by many species, large healthy populations indicates healthy system	Can be grazed when it greens as long as a rest is built into the grazing cycle	
Indian Rice Grass	Excellent food source for birds and rodents, provides cover	Utilized by cattle, effective erosion control on sandy and disturbed soils	
Juniper/Feathergrass Community	Supports a host of species, utilized by large game	Utilized by cattle, control of juniper may be necessary with fire	

Table 6. Cliffs

Species	Significance to Biodiversity	Significance to agriculture	Image
Townsend's Big Eared Bat	Though not considered threatened or endangered the bat's populations have been steadily declining. It is the highest conservation priority of all bats in the western U. S. and all known occurrences should be protected	Indicates compatible management practices	
Ferns	The seeps that support ferns in the area are considered extremely unique and may support previously unknown species	Indicates groundwater is being maintained and in good condition, easily identified and monitored by photograph	

Appendix B. Resource List

Colorado State University Extension	Las Animas County	(719) 846-6881
	Otero County	(719) 254-7608
Natural Resource Conservation Service		(719) 384-5408
Colorado Department of Agriculture		(303) 239-4100
Colorado Water Conservation Board		(303) 866-3441
Colorado Cattlemen's Association		(303) 431-6422
Colorado Division of Wildlife		(303) 297-1192
Colorado Natural Heritage Program		(970) 491-1309