

COLORADO BUREAU OF LAND MANAGEMENT

SOCIAL CLIMATE VULNERABILITY ASSESSMENT

SUMMARY OF FINDINGS – FIELD OFFICE CASE STUDIES

UNDERSTANDING CLIMATE VULNERABILITY FROM THE GROUND UP

Colorado is a rapidly changing state, with its climate, ecosystems, communities, and economies all undergoing dramatic shifts over the last several decades. For the Bureau of Land Management, whose complicated mission ties together the well-being of numerous natural and human systems, the challenge of coping with a changing world requires a holistic, multi-scaled understanding of how people, wildlife, ecology, and climate interact at both the local and regional scale. To better understand the complex linkages at play within the BLM’s 8.3-million-acre mandate, we conducted two in-depth case studies focused on field office management areas known to rely heavily upon public land resources. We aimed to uncover both how local land-based livelihood practitioners rely upon public lands and how that reliance shapes their ability to respond and adapt to the state’s highly variable and increasingly intense climate patterns. To do this, we interviewed grazing permittees, special recreation permittees, and BLM staff involved in these programs (See Table 1, next page). Here, we present a summary of our findings. For a more detailed view, see the full report, found [here](#).

CASE STUDY 1: THE LITTLE SNAKE FIELD OFFICE MANAGEMENT AREA

With over 32% (~1.3 million acres) of its total land surface under the control of the Bureau of Land Management, the Little Snake Field Office management area is a region heavily shaped by the public lands system. Currently home to the largest concentration of permitted grazing activity in the state (at approximately 144,000 Animal Unit Months [AUMs], or 25% of the statewide total), the region is also deeply invested in a tourism-based economy that relies heavily upon access to the region’s vast and diverse public land and wildlife resources. The region’s premier elk hunting and wild horse viewing areas (located west of Craig) attract visitors from around the world, as do its numerous world-class ski resorts and wild and scenic rivers located near the tourism-driven and rapidly growing town of Steamboat Springs.

CASE STUDY 2: THE GUNNISON FIELD OFFICE MANAGEMENT AREA

With just 18% of its land surface in private ownership, the Gunnison Field Office management area’s economics, development patterns, and local culture are influenced by decisions made by public land managers in the BLM and U.S. Forest Service. Here, nearly 40% of all jobs are tied to the local outdoor recreation and tourism industry, with numerous river rafting, fishing, back country skiing, elk hunting, environmental education and community event-related businesses all taking advantage of the region’s public land resources. In addition, the region is also a conservation and wildlife research hotspot, as it plays host to some of the state’s last remaining sage grouse habitat, a rapidly transforming forest ecosystem, and a host of rare plant species.

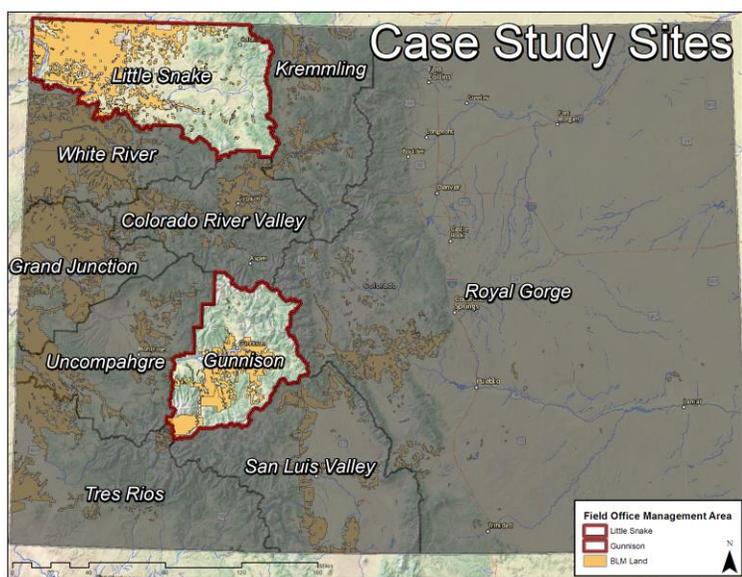


Figure 1 - The Gunnison and Little Snake Field Office Management Areas are two regions with highly complex ties to BLM-managed lands (shown here in orange), both economically and culturally.

KEY THEME 1: CLIMATE VARIABILITY

Across both case studies, interviewees (see Table 1) described heightening climate variability and intensity. Some described unpredictable weather, with extremely wet and dry years making “normal” or average conditions hard to define. Others discussed the unpredictable onset and intensity of the ecologically (and economically) critical winter season, which, in addition to trends towards warmer, dryer conditions overall, was also marked by an increasingly early onset of spring thaw conditions. At the same time, brief warm periods during the winter season were also noted as having potentially negative impacts on regional wildlife-related businesses due to alterations in migratory herd behavior, recruitment, and body fitness. For some grazing and special recreation permittees, this translated to a misalignment between long-standing land use practices and novel conditions due to decreased late summer surface water availability. For fishing and rafting guides, more intense runoff seasons and increasingly dry late season stream conditions presented an impetus to diversify both resource sites and income streams.

KEY THEME 2: DROUGHT AND WILDFIRE

In addition to increases in overall climate variability, discussions of more intense droughts (in terms intensity and persistence) were also a common theme across both research sites. In these conversations, drought emerged as a complex, socio-ecological system-wide stressor, with numerous negative implications for public lands management, conservation efforts, land-based livelihood viability, and the overall health of local economies. For grazing operators, droughts signified potential risks to herd viability (due to the need to sell down herd sizes), intensified pressure to develop groundwater resources, amplified pressure on landscapes from remaining livestock,

CASE STUDY

RESEARCH QUESTIONS:

1. *How are land-based livelihoods with connections to public lands affected by:*
 - a. *Changes in climate and landscape condition?*
 - b. *Changes in public land management associated with changing landscape condition?*

and increased competition with wildlife for already limited water and grazing resources. For recreational operators, it meant threats to cold water fish species, reductions in viable river usage windows, and overall negative impacts on both big game hunting species and various “charismatic” wildlife that play a role in regional nature tourism. For BLM staff, drought signified periods of rising strain on monitoring resources and an overall need for increased vigilance due to drought’s potential to negatively impact overall ecosystem function at a variety of levels.

Unsurprisingly, discussions of drought were often tightly coupled with concerns over observed trends towards more intense, expansive, and frequently occurring wildfires. Although recognized by many as a critical ecosystem process, recent forest die-off due to beetle kill (in the Gunnison area) and increases in encroachment of cheatgrass (which favors rapid fire return rates) left many deeply concerned about both costs associated with fire control and overall impacts on landscape condition due to the potential for large, stand replacing fires. For grazing

2016 INTERVIEWEE TOTALS		
Field Office	Little Snake Field Office	Gunnison Field Office
Bureau of Land Management Staff	7	8
Grazing Permittees	10	14
Special Recreation Permittees	9	10
Other (e.g. Local Hotel Operators)	2	-
Total	28	32

Table 1 - Interviewee Totals. Interviewees were drawn from publicly available and internal BLM databases. To get a comprehensive view of public land dependent livelihoods, we focused on grazing permittees, special recreation permittees, and BLM staff involved in managing these programs.

operators, the ability to wait out the post-fire regrowth period presented a potentially serious challenge, especially if paired with already reduced forage availability due to concurrent drought conditions. For recreational operators, impacts from fire to wildlife habitat – particularly for coldwater fish facing post-fire stream acidification and sedimentation – presented more direct and less easily overcome challenges.

KEY THEME 3: ACCESS, TIMING, AND THE NEED FOR USE FLEXIBILITY

No discussion of public land use and its interactions with climate stressors is complete without addressing the issue of when and in what ways public land resources can be accessed during periods of degraded or vulnerable landscape condition. For some, this was expressed in terms of concerns over the overall reduced availability of public land resources to businesses due to efforts to protect

endangered species or to maintain historical range conditions under an increasingly adverse climate. For others, it meant the decrease in the actual value of certain public land resources (e.g., grazing allotments) as they underwent long term change. At the same time, many expressed concerns about the growing incongruity between existing use dates and actual, on-the-ground ecosystem conditions from year to year (such as the onset of the spring green up, snow melt, or migration timing). As a result, many expressed a need for both more flexible annual use scheduling, better coordination of the hunting season, and, as a result, more accurate monitoring data to ensure that use patterns matched actual plant and wildlife phenology.

KEY THEME 4: STEWARDSHIP AND COLLABORATIVE MANAGEMENT

Although various types of public land users – particularly livestock grazing permittees – expressed the feeling that their use of public lands was viewed as a unilaterally

	Grazing Permittees	Special Recreation Permittees
Key Climate Exposures & Ecological Impacts	<ul style="list-style-type: none"> • Drought • Timing of precipitation & runoff • Increased climate variability • Decreased water availability • Warmer & late onset winters 	<ul style="list-style-type: none"> • Drought • Spring runoff: Intensity, duration, and timing • Winter snowpack
	<ul style="list-style-type: none"> • Cheatgrass and other invasives • Vegetation responses • Increase in wildfire & beetle kill • Interactions with wildlife 	<ul style="list-style-type: none"> • Beetle kill (forest health) • Wildfire (and indirect effects) • Game migration patterns and mortality • Vegetation responses • Game conditions and hunting value • Upstream water temps (fishing)
Sensitivities	<ul style="list-style-type: none"> • Grazing restrictions or reductions • Inflexible timing of permits • Delay in ability to implement rangeland improvements • Interactions with management of other species, such as sage grouse or wild horses 	<ul style="list-style-type: none"> • Perceived reluctance of managers to increase user days • Lottery systems for high-demand fishing areas • Fishing restrictions during drought
Factors Needed for Adaptive Capacity	<ul style="list-style-type: none"> • Strong relationships and trust between BLM staff and land users • Flexible turnout dates • Flexible right-of-way timing (and associated monitoring) for adaptive herd rotation and movement • Ability to coordinate across various public and private landscapes (e.g., USFS, BLM, and private leases) • Timely range improvements (esp. for water development) 	<ul style="list-style-type: none"> • Ability to adjust permits “in-season” • Ability to carry over use days during downturns. • Flexible CO Parks and Wildlife Dates/Tag #'s that match wildlife climate responses • Increased operating capital/disposable income

negative impact to otherwise “pristine” natural resources, one of the most consistent themes that emerged from our interviews was the feeling of stewardship felt – and increasingly recognized by BLM staff and various conservation groups – by those who rely upon the often fragile and unique landscapes that make up much of Colorado’s public lands. Several prominent public land users interviewed for this project argued that few individuals or groups have as much of an interest in maintaining public land ecosystem condition as they do, given that their own well-being is often tightly linked with that of the various vegetation species, wildlife, and other public land users with whom they interact. As such, efforts to develop and implement conservation strategies in the region might do well to continue leveraging this culture of stewardship in whatever ways are deemed appropriate.

MOVING TOWARD ADAPTIVE STRATEGIES

FLEXIBLE MANAGEMENT FOR GRAZING AND RECREATION BLM interviews at both field offices suggested that flexibility, particularly as it relates to grazing and recreational use timing, requires more intensive monitoring than field offices can currently support. A minority of grazing permittees in both cases specifically discussed the possibility of supplementing monitoring resources by acting as primary monitors themselves (this exemplifies the ‘trust’ that ranchers described as in place or as desired – the ability to act autonomously). Given resource constraints, **the implementation of such collaborative strategies could present opportunities for greater management flexibility, particularly if methods were developed to adapt and develop standardized climate and land-monitoring frameworks for use by permittees** (such as the recently adopted Assessment, Inventory, and Monitoring for Integrated Renewable Resources Management (AIM) framework¹). Additionally, grazing permittees concerned with restrictions relating to sage grouse habitat concerns noted that **landscape-scale management across public (USFS, BLM, local) and private borders** (requiring public-private

multi-agency collaboration) has resulted in some grazing flexibility and **should be pursued further**.

ENABLING TIMELY RANGE IMPROVEMENTS Grazing permittees explained how improvements (e.g., subdividing pastures with fencing, creating stock ponds, building pipelines and pumps to more efficiently move water) allow for better utilization of grazing resources, particularly during drought and other conditions that negatively impact forage growth. However, while they were concerned about the lag time required to make improvements (NEPA was specifically mentioned as delaying action), BLM officials felt that NEPA, although time-consuming, is designed to allow staff to “think things through and make the right decision.” Some noted that while private resources (e.g., consultants) could help to speed along NEPA and other such processes, such an approach was often available only to the largest and wealthiest operators. **It may be necessary to find ways to streamline existing NEPA procedures in order to efficiently implement climate-responsive improvements.**

IMPROVING ACCESS TO SCIENTIFIC INFORMATION In both interviews with BLM and politically engaged permittees, there was a noted **desire for improved access to scientific information – be it social, climatological, or ecological – regarding the systems they rely upon and how they might change in the future**. At the same time, it was noted by many that “climate change,” due to its highly politicized nature, may not be the most appropriate frame through which to present this information depending upon the local culture surrounding such issues. As with other strategies, then, it is suggested that a collaborative, locally-driven approach be taken by researchers hoping to contribute to the knowledge base of the state’s various public land users. Likewise, it may be helpful to develop systems (such as existing internal decision support systems in use across the state) that allow public land users and other public land-dependent community members to access and explore scientific information about the region at their own pace.

¹ The AIM framework establishes a set of core quantitative indicators, data gathering methods, and numerous tools for data integration and analysis. Currently, however, it is designed solely for BLM scientist use. See Taylor, J.J., E.J. Kachergis, G.R. Toevs, J.W. Karl, M.R. Bobo, M. Karl, S. Miller, and C.S. Spurrier. 2014. **AIM-Monitoring: A Component of the BLM Assessment, Inventory, and Monitoring Strategy**. Technical Note 445. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. Found at: http://aim.landscapetoolbox.org/wp-content/uploads/2015/09/BLM_TechNote_445.pdf

If you have questions, comments, or require further information, please visit the project website (<http://ncsc.colostate.edu/project/colorado-bureau-land-management-social-vulnerability-assessment>), or contact:

Shannon McNeeley
North Central Climate Science Center
Colorado State University
shannon.mcneeley@colostate.edu
970-491-1852

Bruce Rittenhouse
Colorado BLM
brittenh@blm.gov
303-239-3804