

BUREAU OF LAND MANAGEMENT SAN LUIS VALLEY FIELD OFFICE

SOCIAL VULNERABILITY TO CLIMATE CHANGE ASSESSMENT

SUMMARY OF FINDINGS – INTERVIEWS WITH BLM STAFF AND USERS

PUBLIC LAND-BASED LIVELIHOODS VULNERABILITY TO CLIMATE CHANGE

Many communities in the western United States depend on the health of public lands, and the ways they are managed by federal agencies, including the Bureau of Land Management, for their well-being. Changes in weather, climate, and environmental resources can further impact the health of public lands and can add complexity to decision-making on these lands. Understanding how these combine to affect the vulnerabilities of local livelihoods and environmental resources is a necessary first step to develop climate adaptation strategies that are locally relevant and desirable.

In April 2018, researchers from the Natural Resource Ecology Laboratory, Colorado Natural Heritage Program, and Western Colorado University partnered with the San

Luis Valley Field Office (SLVFO) to conduct a social vulnerability assessment to climate change to inform their ongoing landscape zone assessment and planning efforts (Figure 1).

APPROACH: PLACE-BASED VULNERABILITY ASSESSMENT

This summary synthesizes findings from a place-based vulnerability assessment that relied on in-depth interviews with range permittees, recreation permittees, and traditional users (e.g., hunting and gathering) of BLM-managed land in the San Luis Valley (SLV), and SLVFO managers. The full report can be found [here](#)¹.

Social vulnerability to climate change consists of three inter-related components: exposure (e.g., frequency and severity of drought); sensitivity (likelihood that livelihood will be impacted by climate change or management decisions; dependence on environmental resources); and capacity to prepare for and respond to change. This research was framed by the following research questions:

1. How will land-based livelihoods be affected by climate change in the context of BLM management decisions?
 - a. How are public land user groups vulnerable to climate variability and change?
 - b. How do BLM management decisions influence this vulnerability?
2. What are BLM managers and users doing currently in order to respond to, and prepare for, changes in weather and climate?
3. What do managers and users need to better prepare for, and respond to, climate variability and change, and reduce vulnerabilities?

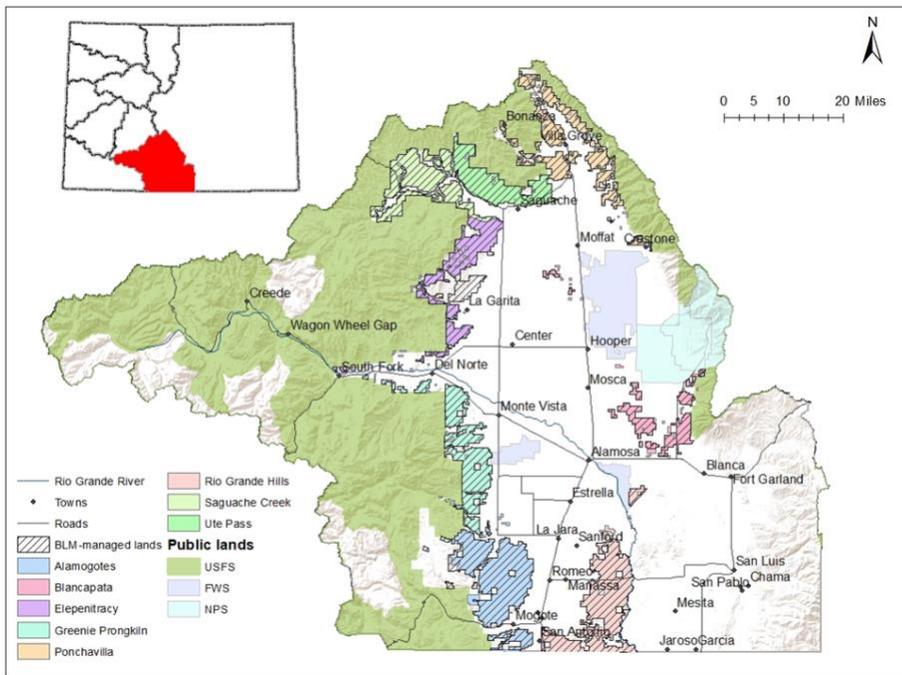


Figure 1: Map of San Luis Valley Field Office boundary depicting the eight zones that are part of their current landscape assessment and planning process. Inset illustrates location of SLVFO in the state of Colorado. Source: San Luis Valley Field Office, May, 2018.

¹ <https://cnhp.colostate.edu/projects/climate-change/>

FINDINGS

OBSERVED CHANGES IN WEATHER AND CLIMATE

Climate change is already occurring in the SLV. Locals observed warming temperatures, particularly in the winter and summer, which is associated with beetle outbreaks and increased drying, respectively; severe, long-lasting droughts since at least the late 1990s to early 2000s; changes to the water cycle (e.g., earlier and reduced snowpack and runoff); and increased climate variability, all of which complicated management planning and decision-making among SLVFO managers and users. These observations coincide with climate change impacts reported in the literature. For example, according to the U.S. Drought Monitor, the Rio Grande Headwaters Basin (HUC4) has been in severe to exceptional drought for several months of many years since 2000 (Figure 2). Warming temperatures has decreased Snow Water Equivalent (SWE - the amount of water contained in snow after it melts, which is a measure of snowpack) by 25% and diminished late-season streamflow (April-July). The timing of snowmelt has shifted in the Upper Rio Grande by 10.6 days from 1965-2007. Further, the Upper Rio Grande has experience declining runoff ratio (i.e., the proportion of precipitation that ends up in the river instead of evaporating) since the 1980's and this is an unprecedented trend in the last 445 years. Climate change projections indicate that these changes in temperature, drought, and the water cycle will be amplified in the future (See full report for citations).

VULNERABILITY OF LIVELIHOODS TO CLIMATE CHANGE AND AGENCY DECISION-MAKING

Users depend on BLM lands and the ecological resources they provide in different ways, and therefore users reported different impacts and vulnerabilities to observed climate changes. Also, BLM agency decision-making, can, at times, increase the sensitivity of local users to climate-related changes. For example, range permittees experienced changes in the timing and amount of water and forage availability on their allotments, which in some cases did not align with their allotment and pasture rotation permit schedule (Figure 3). The BLM had limited flexibility to accommodate requests for changes in the seasonal timing of grazing to accommodate seasonality changes in climate, or changes to livestock type (sheep were considered more climate smart according to some) due to threatened and endangered wildlife and habitat areas of concern.

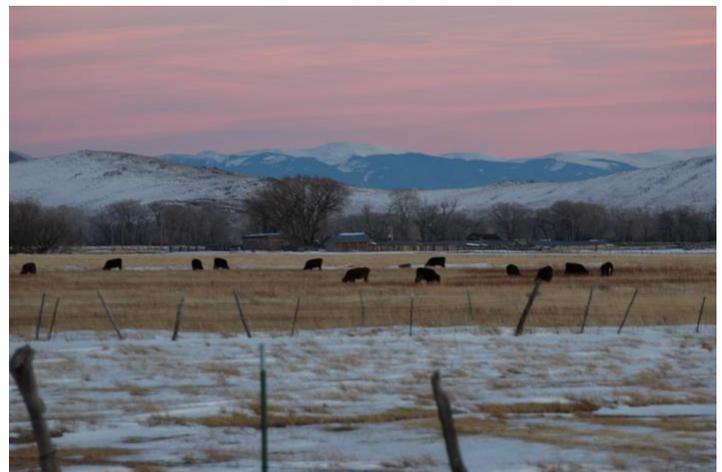


Figure 3: Cattle grazing in Conejos County, San Luis Valley, Colorado. Source: flickr user SLV Native - CC BY-NC-SA 2.0

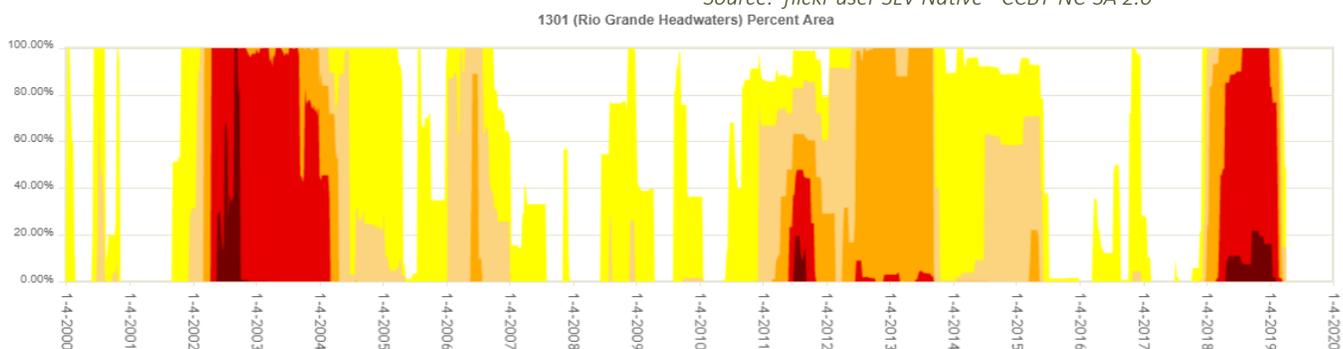


Figure 2: U.S. Drought Monitor for the Rio Grande Headwaters (HUC4), 2000-2019. Colors indicate: Yellow = D0, Abnormally Dry; Tan = D1, Moderate Drought; Orange = D2, Severe Drought; Red = D3, Extreme Drought; Dark Red = D4, Exceptional Drought. Source: National Drought Mitigation Center.

For hunting permittees, most of the agency-related factors that contributed to their sensitivity were related to the Colorado Parks and Wildlife since they set the hunting season and tag structure (e.g., mismatch in timing of hunting seasons and game availability; low mountain lion quotas), though hunters reported that limited law enforcement on BLM-managed land and inflexibility in accommodating alternative campsites in-season and increasing use areas, combined with reduced abundance and changes in the distribution and migration timing of big game has resulted in uncertainty of where to find game, decreased hunting opportunity, and decreased hunting satisfaction among clients (Figure 4).



Figure 4: Elk near Great Sand Dunes National Park. Source: National Park Service.

Observations of earlier and reduced snowmelt and runoff has been incongruent with the permit timing for river-related and ice-climbing activities, which has resulted in decreases in user days and the types of activities that were offered. Also, the current structure for applying for temporary recreation use permits were reportedly not ideal for altering permitted use areas in-season (e.g., in the event of fire restrictions), and permittees suggested that Resource Management Plans were not reviewed frequently enough to accommodate the pace of social and environmental change. Further, for traditional users (e.g., multi-generational hunters, gatherers), changes in the abundance and distribution of fish, wildlife, and plants for subsistence, cultural, and spiritual practices, combined with the poor condition of roads and road closures has restricted access to traditional collection and

hunting areas, which in turn has reduced opportunity to procure those items.

Several of these agency-specific factors that increase livelihood sensitivity were reported barriers among SLVFO managers. For example, limited resources (e.g., funding, personnel), top-down mandates, and policies (e.g., National Environmental Policy Act requirements; planning horizon for RMPs) decreased options to respond, limited flexibility in-season, and decreased timeliness of response.

RESPONSE CAPACITY – IN-SEASON AND PREPAREDNESS ACTIONS

Despite these observed changes in weather, climate, and environmental resources, and BLM-related constraints, users described several tactical, in-season responses and preparedness activities that they used to reduce impacts and vulnerabilities. These are highlighted for each livelihood group in Table 1.

NEEDS TO BETTER PREPARE FOR AND RESPOND TO CHANGE

While there were some differences in the types of reported needs described across SLVFO managers and users, some common needs were emphasized including: 1) more flexible, adaptive management within and across seasons to better accommodate observed changes on the ground; 2) streamlining environmental assessments for more timely response on water infrastructure and habitat improvement projects; 3) more financial and personnel resources to assist with water and habitat improvement projects, planning, and monitoring; and 4) considering revising RMP on shorter intervals to keep up with the pace of social and ecological change. The first two needs are actions that SLVFO managers are currently grappling with in their zone landscape assessment and planning efforts. Finding ways to address them will go a long way in helping local users who depend on BLM-managed lands in the SLV to respond to, and prepare for, climate change. Range permittees and hunting permittees also suggested the need for better coordination between federal and state entities in the SLV, while BLM managers needed more information and resources to support monitoring and assessment of climate trends in the SLV, along with internal and

outreach materials on climate science and adaptation options that are relevant to management issues in the SLV.

CONCLUSIONS

We conducted a place-based vulnerability assessment to document key vulnerabilities of land-based livelihoods who depend on BLM-managed land in the San Luis Valley to climate variability and change, the goal of which was to inform assessment and planning. Documenting local vulnerability using this grounded approach helps identify who is vulnerable to what, where, and why. Past response options provide an analogue for future response and preparedness activities, and they help identify realistic, desirable, and appropriate actions. Alternatively, documenting barriers to, and needs for, response helps provide an understanding of what needs to be overcome to facilitate climate change action. The San Luis Valley Field Office

Table 1: Example in-season and preparedness responses among livelihood groups

Livelihood group	In-season responses	Preparedness actions
Range Permittees	<ul style="list-style-type: none"> -Altered timing of turn-in/turn-out -Took non-use -Leased additional land (grazing reserves) -Purchased supplemental hay -Hauled water/supplemental proteins, or minerals -Liquidate/sell herd 	<ul style="list-style-type: none"> -Installed water infrastructure on BLM land -Adopted high-intensity rotational grazing -Developed comprehensive management plans and adopted holistic management practices -Leased grazing reserves -Established partnerships with other operators, non-operators (e.g., grazing associations, crop producers) -Participated in drought assistance programs/purchased crop insurance -Planted drought-tolerant grasses -Strip-grazed hay on home ranch (e.g., water/soil conservation) -Fed non-native plants to livestock (e.g., Russian knapweed)
Recreation Permittees – hunting	Re-routed trips to other GMUs to accommodate changes in distribution	<ul style="list-style-type: none"> -Diversification (e.g., apply for other permits in/out-of-state, additional game types) -Shifted to offer more drop camps (vs guided trips) -Downsized operation (e.g., fewer hunts; limited game types)
Recreation permittees – mountain biking, camping, river-related,	<ul style="list-style-type: none"> -Cancelled programming -Re-routed to other use areas if available and permitted 	<ul style="list-style-type: none"> -Contingency planning (e.g., alternative use areas/program activities, contracting out programming) -Developed risk management and communication plans to ensure customer safety during
Traditional Use	<ul style="list-style-type: none"> -Altered location/timing for hunting, gathering, fishing -Firewood procurement strategies altered/stopped during drought 	-Altered fishing practices (e.g., steel leaders)

staff intend to use these findings in their zone assessment and planning efforts as they gear up for their Resource Management Plan revision.

If you have questions, comments, or require further information, please contact:
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