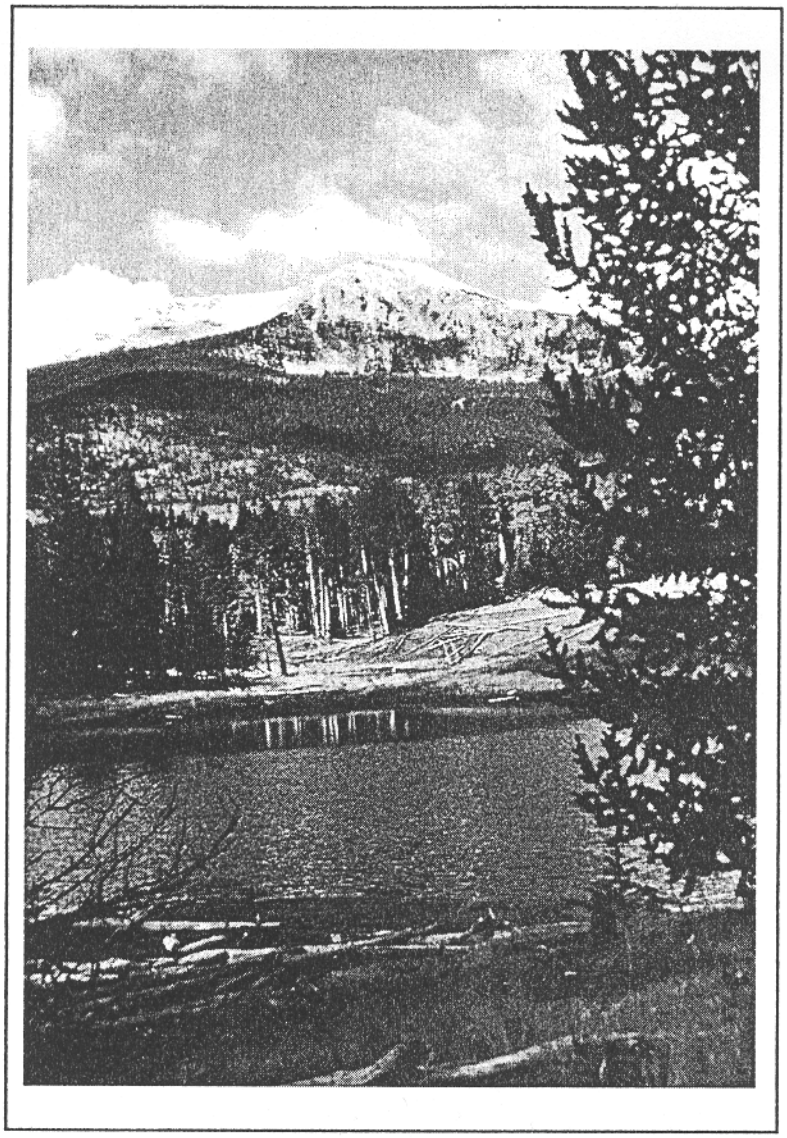

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Managing New Mexico Rangelands for Sustained Use Through the 21st Century

ABSTRACT

New Mexico is a rangeland state. Typically viewed as desert or wasteland, it is more accurate to describe the state as primarily a type of land that grows a wide variety of native shrubs and herbaceous vegetation. New Mexico is characterized by climatic and physical limitations (such as periodic drought and low soil fertility), and has had an extensive history of grazing use by native herbivores. These rangelands generally deteriorated during the latter part of the 19th century. Users of these natural resources frequently misjudged or failed to recognize resource limitations, which are more severe than for rangelands of the midwest or pastures of the southern and eastern U.S. Resource conditions have improved during the 20th century, but debates over conflicting uses of New Mexico rangelands have grown contentious. At the center of this conflict is the traditional use of rangeland for production of livestock, an annual one billion dollar industry within the state. Yet, livestock grazing is frequently perceived as a nonsustainable use. For example, a common perception is that improved resource conditions have typically been achieved by repeated uses of herb-icides to control unwanted shrubs that are a result of overgrazing. This view has some validity. However, natural resource conser-vation requires active management. Our environment is changing due to both natural causes and human-induced impacts. We have to be involved in resource management both to mitigate our impacts and sustain renewable resources. Other than federal and state government agencies, the primary managers of New Mexico's natural rangeland resources are the graziers. Unless the New Mexico populace is willing to substantially increase government involve-ment in land stewardship, an involvement which would primarily be funded at the state level, the livestock industry must continue to be looked to for management not only of forage for domestic animals, but of wildlife habitats, watersheds and various other natural resources. Principles of livestock management exist, and when applied these principles can guide sustained production from rangelands and conservation of renewable resources. The public should (1) direct development of appropriate incentives that reward progressive management, and (2) establish common resource objectives for the good of the entire state in partnership with the livestock industry. Through partnership with agriculturalists New Mexico can lead the West in attaining and practicing multiple use of its principle natural resources, its rangelands.

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New Mexico's Rangelands

Defined

Rangelands support native herbaceous and/or shrubby vegetation, have climatic and/or physical limitations, and have an extensive history of grazing use. Vegetation may be extremely sparse, as in the most barren of deserts, or the lush understory of forested mountains. Limitations may be an arid climate or shallow soils with little fertility. Herbivores may have been primarily insects, or included large herds of bison that infrequently revisited an area.

The diversity of New Mexico's rangelands reflects the broadness of this definition. The state's rangelands span from the Chihuahuan grasslands and shrublands of southern New Mexico, to the plains grasslands of the eastern region, and the intermingled meadows in the mountains of the Southern Rockies (Figure 1). All of these diverse vegetations have some limitations and a history of use by grazing herbivores.

Ownership

New Mexico is primarily a rangeland state (Table 1). As is typical of western states, the federal stewardship agencies, primarily the BLM and the Forest Service, have a prominent role in managing natural resources within New Mexico. However, privately owned rangelands are the dominant category. In addition, state owned lands, generally intermingled among private and federal management, are a significant percentage. Though considerable rhetoric is being addressed towards federal land management issues in the west, the reality is that 75% of New Mexico is under non-federal ownership.

Use

Recently, Torell et al. (1992) have surveyed the importance of public lands to livestock production in the U.S. They have detailed some interesting facts regarding New Mexico. The eastern side of the state (a 14-county region) produces over 1/2 of the beef cattle annually in New Mexico and comprises approximately 1/3 of the state's land area. Table 2 quantifies the dependence of the cattle ranches in these eastern regions upon non-private land. The majority of ranches utilize only small percentages of federal land. In fact, the livestock industry in these regions appear to be more dependent upon state lands. Non-private land is certainly crucial to the western livestock industry. Throughout the western U.S. the public domain lands supply about 19% of the forage required by grazing livestock. However, in New Mexico, beef cattle production is the principle agricultural industry and is in the hands of ranchers on predominately private land based ranches. Given that rangeland is the principle natural resource within this state the quality of the state's environment is directly related to rancher abilities as land managers. Fowler (1992) has characterized these individuals and ranches (Table 3). Any discussion of New Mexico's environment needs to recognize that these individuals can, and will, have a greater impact upon overall environmental conditions within the state than any other segment of our society.

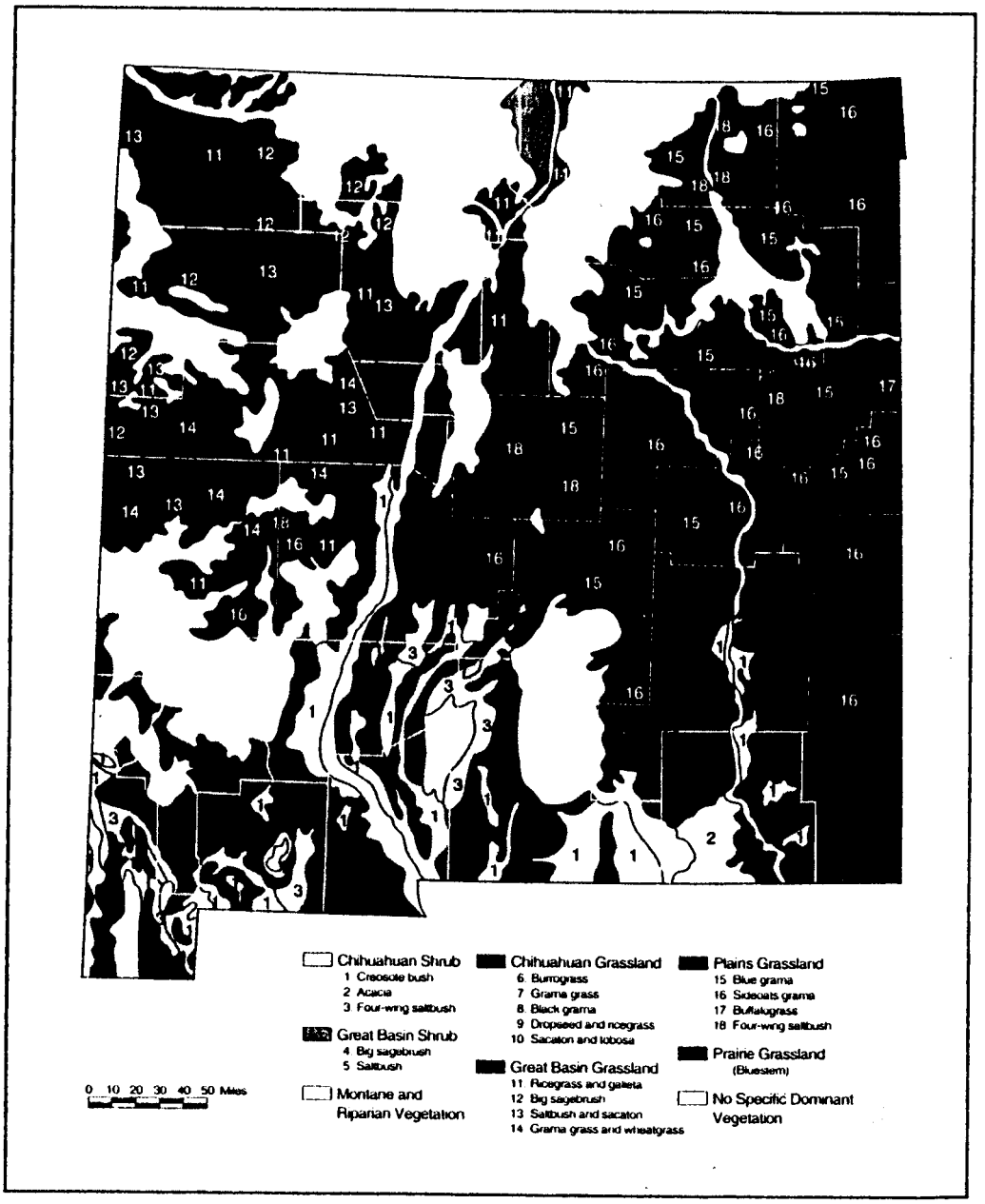

Figure 1. Vegetation assemblages in New Mexico. Taken from Martin (1986).

Table 1
Ownership of New Mexico's Rangeland[a]

	Area[b]	Percent of New Mexico
Private	32.1	41[c]
State	8.8	11[c]
Federal		
Bureau of Land Management	12.8	16
U.S. Forest Service	6.2	8
Other (non-defense)	0.2	<1
Indian	8.8	11[c]
Total Rangelands	68.9	88
Total New Mexico Land Base	77.9	

[a]Diemer & Alvarez, 1991. [b]Millions of acres. [c]Non-Federal rangelands in New Mexico total 49.7 million acres, or 63% of state's total land base.

Table 2
Land Dependencies of New Mexico's Beef Cattle Ranches in Primary Production Regions [a, b]

		Use of non-private land in ranching operations[c]			
		<5%	5-50%	51-95%	>95%
Northeast Region (Colfax, Guadalupe, Harding, Mora, Quay, San Miguel, Torrence, and Union)	Federal	92	7	1	0
	State	56	42	2	0
Southeast Region (Chaves, Curry, DeBaca, Eddy, Lea, and Roosevelt)	Federal	58	23	17	2
	State	48	46	6	0

[a]Torell et al. 1992. [b]These two regions (14 counties) comprise 1/3 of state, and produce over 50% of annual beef cattle gross sales receipts in excess of $480 million (1990 New Mexico Agricultural Statistics). [c]Percentage of total ranch land base that is comprised of non-private (federal or state) ownership.

Table 3
Profile of New Mexico Ranches and Ranchers[a]

	Non-Paid Family	Paid Family	Full-Time Employees	Part-Time Employees	Total
On-Ranch Employment (No. of Persons)	1.84	0.65	0.87	1.07	4.43
	BLM	USFS	State	Private	
Ranch Productivity (Acres/AUM)[b]	11.5	11.0	9.3	5.2	
	Medical	Grocery	Vehicle Repairs/Fuel	Total[c]	
Annual Community Expenditures	1,214.73	4,487.14	4,455.90	18,227.26	
	Deer	Elk	Antelope		
Average Wildlife Populations (No./ranch)	101	39	45		
Years on Ranch	18.96				
Ranches at Least Partially Converting to Real Estate	5.21%				
Annual Expenditures for Improvements on Federal Lands	$19,077				

[a]Adapted from Fowler (1992). [b]AUM = Animal unit month; amount of forage required by a cow with calf for one month. [c]Total includes $8,119.49 for expenses not listed.

Change

The rangeland environments of New Mexico, like other portions of the U.S. and the world, have changed over the past 150 years. In some cases these changes have been dramatic, in some cases they have only been subtle. Typically, environmental changes are reflected in alterations to the native vegetation. There has been either a shift in dominant plant species, or, in the extreme cases, loss of most of the vegetation. Generally, these changes reflect an overall decline in conditions of the resources, especially soil fertility and watershed quality.

Probably one of the most studied areas of vegetation change is southern New Mexico. Closer examination of this information will illustrate key points concerning management of New Mexico's rangeland into the next century.

In the 1850's southern New Mexico, characteristic of the northern region of the Chihuahuan Desert, was a mixture of desert grasslands (typically dominated by the perennial grass black grama) and desert shrublands dominated by honey mesquite, creosote bush, and tarbush (Buffington & Herbel, 1965). All three of these shrub species are native species which have existed in this region for millennia. For example, mesquite has been found in packrat middens dating back from 10,000 to 15,000 years before present time.

By the early 1900's much of the desert grassland region was severely reduced and repopulated by shrubs, principally triggered by a short period of intensive overgrazing by domestic livestock. Shrubs have continued their encroachment during much of this century (Table 4). Subsequent research on grazing tolerance of black grama has indicated that the species can sustain annual utilization of <55% of its current year's growth. Exceeding this limitation will reduce the presence of the species within the ecosystem. Additional factors both anthropomorphic and natural have also contributed to the increase in shrub species during this century (Grover & Musick, 1990). These factors include fire suppression, historic changes in climate, possible impacts of increasing concentrations of atmospheric CO_2, periodic and extended drought, and imbalances in population of native small mammals.

Irrespective of the agents of change the resulting vegetative features of the landscape appear to be strongly resistant to regeneration of prior desert grasslands. Recently, Westoby et al. (1989) stated that these shrub dominated regions are stable and will resist further transition. An increasing body of evidence (Friedel 1991) supports the theory that successional regeneration of grasslands will not occur without interventions (Figure 2). Removal of livestock, as an example, from these areas will not be a blanket prescription for rangeland restoration. In fact, the vegetation change from 1915 to 1963 illustrated quantitatively in Table 4 has occurred in the absence of livestock grazing.

Table 4
Increase (Percentage of Vegetation) in Brush Species in Southern New Mexico from 1858 to 1963[a]

	Year Surveyed			
	1858	1915	1928	1963
Brush free area	58%	25%	23%	0%
Mesquite dominate[b]	4%	22%	21%	46%
Creosotebush dominate	0%	1%	1%	9%
Tarbush dominate	0%	1%	1%	3%
Shrub mixture dominate	1%	5%	10%	16%

[a]From Buffington and Herbel (1965). [b]Data from the USDA-ARS Jornada Experimental Range. Dominate refers to areas where the brush species (or mixture) is ≥55% of the composition of the vegetation.

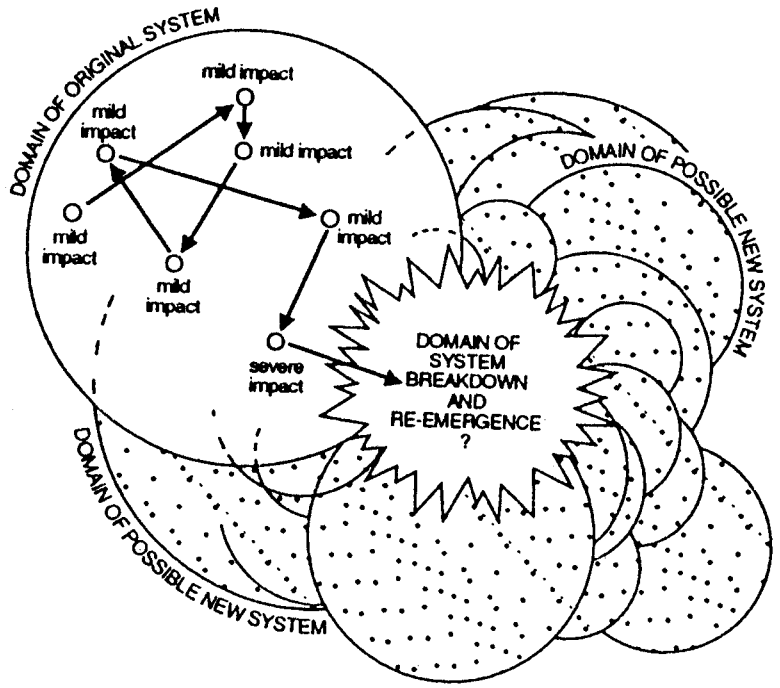

Figure 2. Concept of thresholds for rangeland ecosystems and the development of new vegetative conditions following severe disturbances. From Friedel (1991). This theory is a radical departure from the succession/climax theory that following disturbance the original system would always be regenerated.

Three key points must directly shape our philosophy regarding management of this extensive and changing rangeland environment in New Mexico. Firstly, focusing on past abuses (especially those of a century ago) that may have contributed to the altered environment we see today may be a popular pastime for some, but it is not constructive. The issue today is to understand how to conserve this resource so that it can continue to produce throughout the next century and beyond. Secondly, rangeland resources are extremely diverse and include wildlife, water, minerals, native flora, prehistoric artifacts, fossil fuels, as well as livestock forages. State government can not be expected to manage these resources on over 52 million acres (State and private lands). Thirdly, one of the few viable, economical, sustainable and ecologically sound tools for managing our rangeland environment is livestock. Over eight decades of research have helped identify basic principles of management for sustained use. Given that New Mexico rangelands, like all resources, must be managed, livestock represent a key method for attaining conservation goals. Other tools, especially those that rely on fuel, chemicals and labor, have serious long-term handicaps. The productive rancher is the most constructive steward of New Mexico's rangelands.

Management of Our Rangelands

Need

We attempt to manage all of our natural resources. Whether these resources are the elk herds of Yellowstone National Park, air qualities within major urban centers, or seams of bituminous coal in the Four-Corners region, we have plans of action to achieve stated objectives for their conservation. Management can become ineffective when we operate from a limited base of knowledge concerning a particular resource, when impacted parties are not involved in the development of objectives, or when action plans are unrealistic or unsound.

The reality is that we have impacts, direct and indirect, subtle and profound, intentional and unintentional, upon our environment. We cannot retreat from active management of our natural resources. Even areas of preservation require management, and the sophistication required is escalating as we extend our understanding of human impacts on the environment. The need for continued management of New Mexico's rangelands is paramount. We cannot simply eliminate one or all uses of rangeland resources in a naive effort to "protect" the predominant land environment of the state. Whether you live in Albuquerque or Jal you are dependant upon this land and we must actively manage its resources.

Decades of research and trial and error management have established basic principles for stewardship of our rangelands. Continued research should establish new resource values, expand our understanding of impacts of human interactions within this environment, and refine our knowledge of ecosystem functions. Yet, we have a sufficient base of information from which to develop reasonable and sound management plans. In fact, many ranching enterprises are actively involved in various methods of development, evaluation and revision of conservation management plans. Some methods are organizational, some involve professional consultants, and some are community based. All involve a basic interest in sustaining uses of renewable

resources well into the future while maintaining or improving overall quality of the environment. In one extreme example, a ranching family in southern New Mexico has established a ranch goal for the condition of the vegetation in the year 3000 A.D. This illustrates their emphasis on sustaining use through management.

Involved Stewardship

The Public Rangelands Improvement Act of 1978 established a pilot Range Stewardship Program. Goals of this program reflected a strong emphasis on sustained use, land restoration, and coordinated management. Several pilot projects have been established and have been extremely successful in achieving multiple use objectives for federal rangelands. A primary component of the stewardship program is the use of incentives for the land manager. These incentives can be whatever is deemed appropriate and are not necessarily focused on economic benefits. A purpose of the incentives is to encourage coordinated management with other parties which have valid resource interests, including state and federal agencies.

Interestingly, a private citizens group has assembled in Oregon for similar purposes. The Oregon Watershed Improvement Coalition (OWIC) has grown out of a recognized need for specific coordinated management plans, rather than for continued rhetoric on the "state of our rangelands." This progressive group involves representation from industry, stewardship agencies, and environmental organizations. OWIC has been extremely successful in coalescing disparate interests and developing real solutions for specific resource conflicts. Their incentives include improvement of both diversity of resource uses and quality of overall resources.

Recently, the New Mexico Department of State Lands has announced development of a Stewardship Incentive program. The specific program details are being re-evaluated following a period of public comment. The stated goals are (1) achieve a higher ecological potential of [state] lands, (2) create a higher longterm economic return from the land, and (3) pass the land to the next generation with its integrity, stability, and diversity of its natural communities. This program recognizes that state lands are important to the ranching industry in New Mexico, that the bulk of New Mexico's resources is in private ownership, and our renewable resources require management.

These three programs are examples of progressive stewardship. Common ground among diverse interests have been established. Real solutions to conserving our natural resources have been the goal. New Mexico can achieve successes in sustaining its rangeland resources. Contentious opposition to either grazing livestock or nonlivestock environmental concerns will not contribute to these successes. The state populace should acknowledge the presence of the ranching community as the principle stewards within the state. Conservation practices by these individuals should be encouraged, promoted, and recognized. Development of a partnership between the state and the livestock industry will ensure that our rangelands will be well managed into the next century.

REFERENCES

Buffington, L.C., & Herbel, C.H. (1965). Vegetational changes on a semidesert grassland range. *Ecological Monographs, 35,* 139-164.

Diemer, J.A., & Alvarez, R.C. (1991). New Mexico land use by county, 1982-1988. *New Mexico Agricultural Experiment Station Research Report 644.*

Fowler, J.M. (1992). Western livestock industry survey for 1991. *New Mexico Agricultural Experiment Station Research Report (in press).*

Freidel, M.H. (1991). Range condition assessment and the concept of thresholds: A viewpoint. *Journal of Range Management, 44,* 422-426.

Grover, H.D., & Musick, H.B. (1990). Shrubland encroachment in southern New Mexico, U.S.A.: An analysis of desertification processes in the American Southwest. *Climatic Change, 17,* 305-330.

Martin, W.C. (1986). Vegetation: Plateau, Basin, and Plains. In J.L. Williams (Ed.), *New Mexico in Maps.* University of New Mexico.

Torell, L.A., Fowler, J.M., Kincaid, M.E., & Hawkes, J.M. (1992). The importance of public lands to livestock production in the U.S. *New Mexico Agricultural Experiment Station Report 32.*

Westoby, M., Walker, B., & Noy-Meir, I. (1989). Opportunistic management for rangelands not at equilibrium. *Journal of Range Management, 42,* 266-274.