

RANGE AND FOREST RESOURCES OF NEW MEXICO

New Mexico is big country. Its 122,600 square miles make it the fifth largest state. It extends nearly 350 miles from north to south and slightly less from east to west. Within these boundaries lie the vast extremes of sun-scorched arid land and pine-topped mountain ranges.

Climate is greatly varied. Temperatures have reached 54°F below zero in the northern mountains and 110°F in the southern deserts. Precipitation is low and undependable, ranging from eight inches annually in the southern Rio Grande Valley to 20 inches in the higher mountains.

The average elevation of the state is nearly 5700 feet, ranging from the low point of 2800 feet where the Pecos River enters Texas to 13,150 feet at the top of Wheeler Peak in Taos County.

New Mexico's forest and range resources are made up of six general vegetation types: grassland, woodland, forest, semidesert brush, big sagebrush, and slummy oak. Forest Service figures indicate that 23 percent of these lands, or 18.2 million acres, are forested, with 6.3 million acres of commercial forests and 11.9 million acres classed as woodland. Only 2.6 million acres of the state's 77.7 million acres are cultivated, leaving about 95 percent of the state's area available to livestock and wildlife for grazing, excluding acreage in urban and highway development.

Forms of Land Ownership

Four major types of land ownership exist in New Mexico (Table 1). The federal government is the largest land owner in the state, with about 34 percent of the total acreage. The Bureau of Land Management administers nearly 14 million acres and the Forest Service slightly over 9 million acres, together representing about 86 percent of the federal land. The state-owned land makes up about 12 percent of the total and Indian lands 8 percent, leaving only 46 percent of the state privately owned.

Multiple Use of Range and Forest

The state's lands are truly an example of multiple use. Only 5 percent of the land area is dedicated to single-purpose, and the remainder provides an interesting array of uses.

In 1970, there were 1,331,000 head of beef cattle and 791,000 head of sheep on range and forest lands of New Mexico. These livestock provided \$256,526,000 in cash receipts, 71 percent of the total received for all agricultural products marketed in the state.

Twenty-four game refuges totaling almost 260,000 acres provided areas for enjoyment by the public as well as research areas for scientists. Big-game numbers are at

all-time highs since wildlife censusing began in 1926 when there were 41,000 deer, 712 elk, and 2957 antelope in the state. In 1964, there were 301,750 deer, 11,046 elk, and 15,000 antelope providing a harvest of about 31,000 big-game animals during the state's various hunting seasons. It was estimated that \$54.3 million was expended in New Mexico by hunters and fishermen in 1963.

Recreation is another of the many uses of New Mexico lands. In addition to the recreation use on much of the Forest Service and Bureau of Land Management's 22.8 million acres, there are public outdoor recreation areas in every county in the state, representing more than 780,000 acres. More than 156 square miles of water surface in lakes consisting of 40 or more surface acres each provide other sources of recreation.

New Mexico's commercial forests have 6.6 billion cubic feet of wood in the form of sound, live trees and 28.3 billion board feet in sawtimber trees. One out of every seven manufacturing workers in the state is employed in lumbering and wood conversion industries.

The lands of New Mexico not only provide a continuing source of pleasure and income to the people of the state, but visitors from other states continue to increase, placing even greater demands on forest and range resources.

Table 1. Land Ownership in New Mexico, 1965.

Type of Ownership	Acres	Percent
Federal		
Bureau of Land Management	13,826,454	
Forest Service	9,086,504	
Department of Defense	2,823,907	
National Park Service	240,023	
Agricultural Research Service	200,576	
Bureau of Reclamation	185,914	
Bureau of Indian Affairs	126,517	
Fish and Wildlife Service	85,600	
Atomic Energy Commission	72,751	
Corps of Civil Engineers	13,327	
Other Federal	12,453	
Total	26,674,026	34.3
State	9,090,372	11.7
Indian-Tribal and Allotted	6,536,020	8.4
Private and Other	35,466,618	45.6
Total	77,767,036	100.0

The Role of New Mexico State University

The land-grant university of New Mexico has played a valuable part in the development and use of the range and forest resources of the state. This role will become increasingly more important as demands on the environ-

ment expand. There will not only be augmented needs for food from these lands, but these needs must be met while maintaining scenic vistas, hunting and fishing areas, and open spaces necessary to nourish the soul of man.

The Agricultural Experiment Station of New Mexico State University has conducted research on range and forest lands since its inception in 1889. The primary objectives have been to study methods to improve or maintain the resources while producing maximum harvestable products. An extensive volume of research findings has been made available through publications and Extension Service personnel for use by the people of New Mexico. This communication has significantly influenced the improved agricultural utilization of the state's range and forest resources.

The income received by ranchers from livestock has continued to increase. In 1959 the cash receipts from livestock were \$135 million compared with \$240 million in 1968. Pounds of beef produced in New Mexico increased 86 percent from 1924 to 1963 while cattle numbers actually decreased slightly.

Currently, 19 different research projects are under way in the Agricultural Experiment Station pertaining specifically to range and forest resources and their management.

Through the cooperation and help of numerous public agencies such as Agricultural Research Service, Forest Service, Bureau of Land Management, Soil Conservation Service, and Game and Fish Department, New Mexico State University serves the people of the state through continued advancements in agricultural production technology.

The future responsibility of New Mexico State University in developing the state's natural resources will become increasingly important. The need for greater productivity from our natural resources is increasing faster even than the population, especially from areas with the climatic and environmental problems characteristic of New Mexico's arid lands. The low and extremely variable rainfall, high temperatures, and high rate of evaporation, coupled with serious brush invasion and soil erosion, drastically limit productivity on New Mexico rangelands. Future development of range and forest resources demands solutions to the following problems:

Brush control and reseeding. Control of undesirable brush and replacing it with productive species are two of the greatest problems facing land resource scientists in New Mexico. An estimated 50 percent of the land area of New Mexico is in need of brush control. Much of the soil erosion from rangeland comes from brush-infested areas. Unless reliable and economically efficient methods are developed to control these low-value species and replace them with desirable grasses and shrubs, the land will continue to become less productive. This will require innovations in machinery and equipment, development of new varieties of native and introduced plants through selection and breeding, and development

of safe new selective herbicides. Techniques must be developed to improve the micro-environment to meet the requirements of the plant to be seeded.

Water management. In arid lands, management of the meager precipitation is of utmost importance. Methods are needed to better utilize the high-intensity, short-duration type of rainfall to retain the water on the soil as well as reduce soil erosion. Techniques for "water harvesting" must be developed whereby micro-watersheds provide runoff water for concentrating moisture in small, but highly productive sites. Also, water from sites of low potential must be moved to areas of high potential.

Energy relationships in various range and forest ecosystems. This will require basic studies in analyses of the flow of energy through the ecosystem. These questions must be answered if we are to best use the energy produced: How much of the sun's energy is captured by various vegetation types and converted to plant life? How much of this energy can be harvested by man or his animals and maintain productivity in the system? What are optimum densities of plants on forest and range for maximum use of solar energy? What is the best method of harvesting the plant energy?

The use of animals other than domestic livestock needs to be studied. Plants such as creosotebush and mesquite are useless for domestic livestock; but, documentation exists that such exotic animals as the camel have grazed creosotebush and mesquite plants and done well. Perhaps these plant communities represent ecological niches yet unfilled by the proper grazing animal. Finally, man's additions to the environment through fertilizers and pesticides must be evaluated, as to their effects on the flow of energy and nutrients in forest and range ecosystems.

Quality of the natural environment. Soil erosion, siltation, and dust storms are still New Mexico's major source of environmental pollution. These not only cause air and water pollution but represent irreplaceable losses of topsoil, already critically limiting in New Mexico. Study must continue on effects of industrial pollution on forest and range resources, since both air and water pollution have influences on plant life.

Possibilities for increasing usefulness of range and forest resources span from radical innovations to patient application of principles discovered from past research. Much of the future of the state will hinge upon the imagination and ingenuity of researchers and teachers at New Mexico State University. Future managers of the state's vast public range and forest resources will be trained with tomorrow's needs for the state and nation in mind.

With sustained confidence and support from the people of New Mexico, research will continue to unlock doors into even greater use of the state's arid and semi-arid lands.

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