

A Brief History of Range Management in the United States

Jerry L. Holechek

Range management is relatively young compared to other disciplines such as mathematics, chemistry, agronomy, animal husbandry, or physics. It is perhaps the only science that is entirely American in origin and development. In order to understand why this science developed, it is necessary to understand the history of livestock grazing in the western United States.

Coronado brought the first cattle and horses into the western United States in 1540. Animals escaping from this expedition began stocking ranges in New Mexico, Arizona, and Colorado. In the 1600's numerous Spanish settlements were established in the Southwest. Cattle and horses escaping from these settlers multiplied rapidly under the mild climatic and abundant forage conditions in the Southwest. Wild horses were common in the Great Plains and Southwest by the mid-1600's. Horses were brought into eastern Oregon and Idaho by Indians in the early 1700's, but cattle and sheep did not come into the Northwest until the late 1700's.

Prior to the Civil War, small herds of cattle and sheep were raised for domestic purposes in localized areas of the west. On the coastal prairie of Texas, the Pacific prairie of California, and the Palouse prairie of southeastern Washington, cattle were raised on a large scale basis of local marketing. The end of the Civil War triggered the beginning of the livestock industry in the West. The completion of the railroad into Kansas in 1866 provided a market for longhorn cattle that were present in vast numbers on Texas ranges. Cattle drives to Kansas from Texas peaked around 1872, and had nearly ended by 1880 because of completion of the railroad into Texas.

The growth of the cattle industry on the Northern and Central Great Plains began in the early 1870's. Most of the cattle used for base herds in the plains area came from Texas and the Palouse country of Oregon and Washington. By the mid-1880's cattle had reached peak numbers on most Western ranges and range exploitation was at a maximum. Cattle numbers were greatly reduced on the Northern Great Plains and Palouse Prairie by the severe winter of 1884-1885. Severe drought during the summers of 1891 and 1892 resulted in heavy cattle losses from starvation on Southwestern ranges.

Between 1865 and 1900 the sheep industry also expanded rapidly in the West. There was considerable conflict between cattlemen and sheepmen in the 1890's and early 1900's. This was because sheepmen were quite mobile and grazed through ranges which cattlemen claimed because of past use. Lack of mobility on the part of the cattlemen made overstocking much more critical to his operation than to the sheepman, whose operation was based on movement from

one range to another. Government intervention beginning in 1905 gradually ended the conflict.

Between 1880 and 1910, there was a great reduction in the rangeland resource. This reduction was caused by overgrazing and conversion of rangeland to farmland. During this period, the railroads brought into the West large numbers of people who were seeking land provided by the Homestead Act of 1863. Much of the tall grass, Pacific, and Palouse prairies were put under cultivation as the result of this act.

The deterioration of Western ranges in the latter half of the nineteenth century did not go unnoticed. Range abuse on the Palouse Prairie was reported in a Walla Walla newspaper as early as 1862. Numerous reports of overgrazing were made by livestock associations and reporters in practically all parts of the West in the 1880's and 1890's.

In 1895 Jared G. Smith, an assistant agronomist with the U.S. Botanical Survey, noted extreme range depletion in the Southern and Central Great Plains. He recognized soil erosion, increases in poisonous plants, reductions in palatable plants, soil compaction, and increase of woody plants as signs of range deterioration. In 1915 Frederick Clements, the famous Nebraska plant ecologist, addressed the problems of range abuse. He recommended that rest, controlling season of use, reducing livestock numbers, controlling noxious plants, and reseeding be used to stop range deterioration and initiate range improvement.

In the mid 1890's, H.L. Bentley, a special agent with the U.S. Department of Agriculture, initiated the first range experiments concerning correct stocking rates, range pitting and range seeding. Soon after the turn of the century most state and federal agencies in the West had range research programs. Between 1910 and 1915, Arthur Sampson conducted the first grazing system experiments in Oregon. He reasoned that deferment of grazing until seed maturity would allow for seedling establishment and replenishment of carbohydrate reserves.

Government intervention into grazing problems on the western range began in 1898 when the Department of Interior granted grazing permits to limit the number of livestock on federal lands. In 1905 the Forest Service was set up in the Department of Agriculture and the process of forage allotment was initiated. Between 1910 and 1920 grazing laws were put into effect on National Forest lands. Because the price of cattle was high during World War I, a period of very severe overgrazing took place between 1915 and 1920. National Forest ranges began to improve again after World War I because scientific range management practices and controlled grazing were once again implemented. However, other rangelands in the West continued to deteriorate.

The discipline of range management flowered and developed in the 1920's. By 1925 approximately 15 colleges were

The author is assistant professor of range ecology, Department of Animal and Range Sciences, New Mexico State University, Las Cruces, New Mexico 88003.

offering courses in range management. Frederick Clements and James Weaver developed many basic ecological concepts during this period. Both men were professors at the University of Nebraska. Clements developed theories on plant succession while Weaver, at the same time, initiated some of the classic ecological studies involving the tall grass prairie. The first textbook on Range Management was written in 1923 by Arthur Sampson, who is considered to be the father of range management. Much of the research of the 1920's involved the effects of different stocking intensities on forage and livestock production. Some of the first research examining plant composition changes under different grazing intensities was published during this period.

The biggest event of the 1930's in range management was the passage of the Taylor Grazing Act of 1934, which placed the administration of remaining public lands under the Grazing Service, which later became the Bureau of Land Management. In 1933 the Soil Erosion Service was established in the Department of Interior. It was transferred to the Department of Agriculture in 1935 and renamed the Soil Conservation Service. This organization was formed because of alarm over the drought in the Great Plains in the mid 1930's. Another notable happening of the 1930's was the publication of the book *The Western Range* by the United States Department of Agriculture. This book gave an inventory of western rangelands and discussed problems associated with them. Overstocking was emphasized as the major reason for deterioration. It reported that 58% of public rangeland was in poor condition while 26% fell into the fair condition class. Only 16% of the public rangeland was in good or excellent condition. In spite of a growing body of knowledge, range deterioration continued through the 1930's primarily because of lack of application of range management facts. During this period the Grazing Service allocated forage on the basis of ocular estimates which were in most cases highly inaccurate and resulted in further range deterioration. Some very good research was reported concerning methods for quantifying vegetation productivity, utilization, and composition in the 1930's.

Three very important events occurred during the 1940's. The first was the discovery of auxins which regulate plant growth. This led to the development of 2,4-D, which made large scale control of noxious plants practical and provided a great tool for range improvement. The second event was the formation of the Society for Range Management in 1948. The third event was E.J. Dyksterhuis's paper published in the *Journal of Range Management* called "Condition and Management of Rangeland Based on Quantitative Ecology." This paper proposed that range condition be evaluated on the basis of the amount of climax vegetation remaining on a site. It introduced the terms of *decreasers*, *increasers*, and *invaders*, which have become key words in modern day range management. This paper has probably had more impact on range management theory than any other single publication. During the 1940's state, federal, and local agencies became much more effective in range management. The first studies examining the nutrition of range animals were conducted in Utah in the late 1940's by C. Wayne Cook and Lorin Harris. The first edition of *Range Management* was published in 1943 by L.A. Stoddart and A.D. Smith. This book has been revised twice, once in 1955 and once in 1975, and is the standard range management textbook.

The 1950's were years of terrific improvement in the range resource on public lands. These improvements were the

results of water development, brush control, reseeding, stocking rate adjustments and grazing period adjustments. Considerable range research was directed towards range improvement by the use of herbicides. Watershed and range nutrition problems also received much attention. More range research was conducted in the 1950's than in all the years prior to 1950 put together.

During the 1960's the multiple use concept of range management on federal lands developed. Wildlife, water, and recreation became recognized as important range products as well as red meat. Previously, range research and management had been geared towards producing forage for livestock. Methodology for range nutrition and ecology studies was greatly improved during the 1960's. Quantitative methods involving microscope techniques were developed for studying food habits of range herbivores. Computer modeling was applied to rangelands as a tool for simulating and managing range ecosystems. During this period public concern over the environment and management of natural resources accelerated. There was growing opposition to livestock grazing on federal lands. The National Environmental Policy Act of 1969 was passed by Congress in response to pressure from environmentally concerned groups. This act led to the requirement for Environmental Impact Statements by federal agencies. During the 1960's several other countries developed range research and management programs based on methodology and concepts derived in the United States.

The 1970's were characterized by considerable change in regard to the emphasis of both range management and research. There was considerable shift to non-consumptive uses of public rangelands. Livestock grazing on public ranges was reduced 48% between 1966 and 1972. There have been further reductions since 1972, and this trend is expected to continue in the 1980's. Toward the end of the 1970's and into the present, concern over the world population explosion has generated renewed interest in using public rangeland for livestock production. This is because lower energy inputs are required to produce red meat from rangeland than cropland. In addition, range forage can only be converted into products usable by man with grazing animals. Range improvement on private lands accelerated during the 1970's because of improved information and education programs by state and federal agencies. Another factor of considerable importance was that the 1970's rancher was much better educated than those from previous periods. Watershed and wildlife aspects of range management attracted more public attention and research dollars than in the 1960's. It appears that range watershed management will receive more and more emphasis in the future because of restricted water supplies and increasing human populations. Range research has been more detailed and sophisticated than in the past. In the last few years many large-scale studies have been initiated examining several parameters associated with range ecosystems using an interdisciplinary approach. Fire has received considerable attention as a management tool in the 1970's and will probably receive greater use in the future because some segments of the public find herbicides objectionable.

Considerable progress has been made in the past 40 years. Recent data shows poor condition public rangeland has been reduced from 58% to 32% since 1935. Despite a general improvement in range condition on both public and private lands, range management has lagged behind other disci-

plines. Four reasons for this include:

- 1) Range ecosystems are highly complex and have considerable variation.
- 2) Funding allocation to studying range problems has been low when compared to that for other areas of natural resource management.
- 3) Government agencies such as the Bureau of Land Management have been forced to allocate much of their monetary and personnel resources towards developing environmental impact statements in the 1970's. This has severely retarded range improvement on public lands.
- 4) Methods available to study range ecosystems are often crude and many range experiments require several years before any conclusions can be reached.

Looking into the future it appears that rangelands in the western United States will become increasingly important in providing red meat, water, wildlife, energy, and recreation needed by the American public. However, the basic land resource will shrink because of conversion of rangeland to farmland, housing, summer houses, industrial sites, high-

ways, and airports. Livestock grazing will continue on public rangelands because this is the most efficient way to use the range forage resource. In addition, an increased population coupled with higher energy costs will dictate that most of our red meat be produced on land unsuited for cultivation. This is because efficiency is improved if plant foods are fed to man directly. Water will probably become the most important resource derived from rangeland particularly in the Southwest. A sky-rocketing demand for both water and red meat will probably result in more funds for range research directed towards these two products.

How rangelands are used in this country in the future will depend on what happens in other countries as well as at home. As long as the world population grows at an ever accelerating rate, there will be greater pressure to increase production from rangeland in this country. Hopefully in the future the public will become better informed on management principles, and more supportive of range improvement programs. Finally, I am optimistic that range management will progress much faster in the future than in the past.

The Indelible Bull's-eye

Larry C. Eichhorn

What a sight! Giant (for the 1940's) four-engined bombers rumbling in, dropping strings of practice bombs from open bomb-bays, throwing up dust as the bombs hit the ground. Many remember the U.S. Army Air Force B-17 bomber squadrons that trained in northcentral Montana during World War II. The crews and planes are long since gone, of course, but they've left a memorial behind. The one part of the above scene that remains is the target the airmen were trained to hit.

This particular target can be seen on public lands 50 miles east of Lewistown. It was used by the Army Air Force beginning in the fall of 1942 through the fall of 1943. Located in a draw to make it hard to find and hit by the low-flying B-17s, the 1,000-foot target consists of 5 concentric rings. The diameter of the center ring is 200 feet. Apparently made by a 14-inch, one-way molboard plow, the furrows are still 18-24 inches wide and from 6-10 inches deep today even though the target is now 38 years old.

How long will it take for natural processes to erase the target? A good question. Curiosity getting the better of me, I decided to look over the vegetation and soils around the target. I took forty plot measurements on the rings and forty more plot measurements between them as a basis of comparison, using the vegetation measurement method adapted

from Daubenmire (1959). Comparisons were given statistical tests according to procedures described by Freese (1967). Plants on the area included western wheatgrass (*Agropyron smithii*), green needlegrass (*Stipa viridula*), Sandberg bluegrass (*Poa sandbergii*), prairie junegrass (*Koeleria cristata*), fringed sagewort (*Artemesia frigida*), Nuttall saltbush (*Atriplex nuttallii*), and big sagebrush (*Artemesia tridentata* spp. *wyomingensis*).

One significant difference I noted is the canopy cover and height of big sagebrush on the rings compared to the cover and height between the rings. On the rings big sagebrush has 29% canopy cover and an average height of 15 inches. Between the rings, it has 13% canopy cover and measures 5 inches in height. Gerdrum-Tealette soil complex predominates on the plot measurements I took. Plowing the rings increased the clay content of the upper soil because of the mixing of the A and B horizons. This intermixture and furrow area provided more moisture accumulation and infiltration and nutrients for plant growth. Hence the greater canopy cover and height of big sagebrush on the rings. This is the main reason the target is still visible today.

Another significant difference is the presence of green needlegrass only on the rings, not between them. Jorgensen (1979) reported that where clay loam soils were plowed and abandoned, green needlegrass increased in abundance. He felt this may be as a result of the increased clay content of the

The author is district wildlife biologist, Bureau of Land Management, Lewistown, Montana 59457.