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George Elmo Glendening—An “Unknown Star” in Southwestern Range Research

Jerry R. Cox, Thomas N. Johnsen, Jr. and Howard L. Morton

Students of range management are often unaware of our founders and their contributions to current thinking and research approaches. While we searched the literature on the development of artificial revegetation of southwestern semidesert grasslands, a number of relatively unknown scientists emerged who had an effect beyond their publica-

tion record. George E. Glendening was such a person. He published 37 articles, 10 of which are found in various journals; the remainder are in publications directed toward southwestern ranchers. The popular publications stressed the need for fundamental research and the application of research findings to rangeland problems. Although his works are rarely cited, his ideas can be seen in most issues of the *Journal of Range Management* and *Rangelands* under topics of forage production, utilization, revegetation, soil

Authors are range scientist, research agronomist, and plant physiologist, respectively; USDA, Agricultural Research Service, Aridland Watershed Management Research Unit, 2000 E. Allen Road, Tucson, Ariz. 85719.

and water requirements of plants, selective control of undesirable plants and the presentation of research findings for ranchers. Glendening criticized those who tried to short-cut the hours of tedious research, freely shared ideas, and is recognized for dedication, constructive thinking, and the development of new ideas which have made the science of range management a reality.

George E. Glendening was born on April 26, 1912, at Plainville, Kansas. The family, considered wealthy by standards of the time, raised wheat and cattle, operated a slaughter house, meat market, and grocery store. The family moved to Arizona in 1919 due to the father's failing health. When he died in 1921, George and his brother Fred delivered newspapers to supplement the family income. After high school graduation in 1929, he attended Oklahoma State University to study agriculture, but he returned to Phoenix to attend Phoenix Jr. College and later transferred to the University of Arizona, receiving a Bachelor of Science in agriculture in 1933, and a Master of Science in botany in 1939.

In the fall of 1933 a Junior Range Examination was offered at the Tucson Post Office as part of the National Recovery Act. The examination, consisting of equal parts of animal husbandry and botany, was used to select applicants for the Forest Service Research Organization. Only 2 applicants passed the difficult test: Glendening and Robert R. Humphrey. Both were hired by the Forest Service Research, beginning their professional careers at the Santa Rita Experimental Range near Tucson (personal communication, R.R. Humphrey).

Professional Accomplishments

Pre-World War II.

Shortly after being hired by the Southwestern Forest and Range Experiment Station as a Junior Range Examiner and Assistant Forest Ecologist, Glendening was charged with developing revegetation techniques and determining methodology to estimate animal utilization. A study was initiated to determine the importance of litter on germination of perennial grasses. He found that 1 inch of barley litter, placed over a seeded plot, increased germination over 20 times that of untreated plots. Realizing the importance of litter, but also aware of the prohibitive cost of barley straw and its transportation to remote areas, he suggested the use of natural litter, such as broom snakeweed or burroweed. Roughing up the soil 2 years before planting with farm implements and reseeding into a litter base of annual forbs and grasses was recommended. During periods of drought, litter had little effect on germination. Glendening transplanted Rothrock, sprucetop, and black grama grasses. Transplant survival was 37 percent on sandy and loam soils but no plants survived on clayey soils where erosion continued to accelerate.

He incorporated litter to prevent sheet erosion and increase infiltration into fine textured soils. Litter treatments did not improve germination or seedling survival, but when soil from areas supporting perennial grasses was spread on "adobe flats", they were successfully revegetated. The technique was recommended only for use on small critical areas where erosion threatened personal property.

Management implications based on litter and reseeding studies stressed the need for reorganizing grazing systems. A rest period was needed to replenish plant vigor and restore

litter to protect seedlings from high soil temperatures and erosion. Glendening questioned the use of highly palatable climax grasses in revegetation trials. As an alternative, he suggested the use of "less desirable species" such as tanglehead and alkali sacaton. These species could then be used during the growing season to provide rest for upland perennials. Results of transplanting and reseeding research efforts in Arizona, New Mexico, and southwestern Texas were integrated into a single publication which gave species and seed mixture recommendations based on elevation, rainfall, and adaptation trials of native and introduced grasses.

By the late 1930's, it was apparent that fundamental concepts of ecology had to be expanded to include grazing animals and their impact on semidesert grasslands. In 1942, Bill McGinnies, Ken Parker, and Glendening published "Southwestern Range Ecology." The text provided a current literature review of ecological principles and stressed litter management (utilization).

Glendening authored and co-authored a series of articles dealing with concepts, methodology, and limitations of plant utilization. In 1941, he was promoted to Associate Forest Ecologist and assigned a leadership role for the development of range utilization standards on Arizona pine-bunchgrass ranges and central Arizona chaparral ranges. Research efforts, however, were interrupted when Glendening, a Commissioned Officer, was called to active duty in the U.S. Army Air Corps.

Post-World War II

After World War II, Glendening returned to the Santa Rita Experimental Range, where he was employed as a work center leader and completed a classical publication on livestock preferences as influenced by water distribution, topography, species palatability, and multiple use in pine-bunchgrass ranges. He conducted basic ecological research which identified the reasons for the spread into and persistence of velvet mesquite in desert grasslands.

In 1949 he began a series of popular articles to educate ranchers on the application and usefulness of herbicides. He discussed the philosophy, methodology, and need for selective herbicides for control of mesquite, cactus, and juniper. He also determined that 2,4-D was neither harmful to sheep nor inhibited the germination of mesquite.

Glendening left the Forest Service in 1954 and was employed as Agricultural Manager and Advisor for Copper State Chemical in Arizona. He advised ranchers on the use of insecticides, herbicides, and fertilizers on rangelands and irrigated pastures.

After three years, he returned to the Forest Service and began studies to mechanically control chaparral with herbicides and with fire. He showed that allelopathic chemicals were present in chaparral litter and was instrumental in developing fall burning techniques to reduce erosion and increase natural revegetation of perennial grasses on steep slopes.

George E. Glendening died of a heart attack on December 30, 1963, at age 51. A testimony presented to his family from his coworkers states that he was "A man who gave his best." However, he was much more than that: Glendening was an active thinking force who constantly conceived and shared new, relevant ideas, always trying to put them to work for

these accomplishments we salute George E. Glendening, an "Unknown Star" in Southwestern Range Research.

Chronological Literature Citation

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