



Monitoring Rangelands in Arizona

Method assesses changes over time for better management

By Joanne Littlefield

University of Arizona range specialist George Ruyle has made his career counting and analyzing plant populations on rangelands—and teaching others to do the same. For many people the term “rangelands” conjures up images of cattle on open land, cattle drives and cowboys. But the condition of rangelands isn’t just a matter for ranchers to consider. These vast areas dominated by grasses and shrubs actually serve multiple uses that include not only ranching but also farming, mining, recreation, and residential communities. Rangelands are especially vital to the watersheds and the people living downstream from them.

Counting plants is one way to gauge the changes that have occurred. The process is simple: Ruyle marks off a plot 40 centimeters square in several places across a grazing allotment. He notes the name and quantity of each plant and records this information for each plot. Over the years he returns to the same marked spots and measures again, noting changes in the density or the types of vegetation present. What he finds influences recommendations for grazing and other land uses.

The painstaking work of assessing changes to the landscape by counting the number and type of plants is supported by new technology and techniques such as global positioning systems (GPS), digital cameras, satellite imagery and computer spreadsheets. As a researcher with the UA College of Agriculture and Life Sciences (CALs), Ruyle notes that the basics, however, remain the same.

“Measuring the same thing over time—that sort of defines monitoring,” he says. The changes found may include problems associated with an invasive weed species taking hold, or with parched land needing a rest from uses like animal grazing, or even a poisonous plant that may have cropped up that poses a threat to horses, cattle or other animals.

“On the other hand,” Ruyle explains, “conditions may have improved, with improved management, enough to warrant an increase in the number of livestock grazing in a particular area.” In addition to their domestic animals like grazing cattle, ranching operations in Arizona also support deer, elk and other wildlife. Ranches are located on public and private rangelands, which together comprise approximately 86 percent of Arizona’s total area of 62.4 million acres. The average herd size of a ranching operation in the state is about 200 head.

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Over the years, through CALs research and outreach efforts, ranchers and other land managers have been able to develop site-specific rangeland monitoring protocols by using historical data, by analyzing local weather patterns and by studying rangeland conditions in detail. Scientists at the University of Arizona have spent more than a century studying and monitoring rangeland conditions in various parts of the state.

Natural ecological systems throughout the Southwest have suffered from years of drought; rangelands are no exception. When a prolonged drought plagues the state, ranchers in Arizona respond by reducing the size of their cattle herds. Conditions over the past decade have led to reductions typically over 50 percent. But range plants are quite resilient if given the chance to recover, according to Ruyle.

“Some parts of the state have suffered more than others,” he says. For example, Graham County in east central Arizona has been drier than most parts of the state, although summer 2006

precipitation there was enough for the land to begin recovery, in terms of forage production,” according to Ruyle. Mohave County in northeastern Arizona also had some relief from summer rains.

“Adding to the complexity of land and water use issues,” Ruyle says, “is the fact that the water table has been depleted due to several years of less than normal summer and winter moisture, and increased development, which depletes the groundwater.”

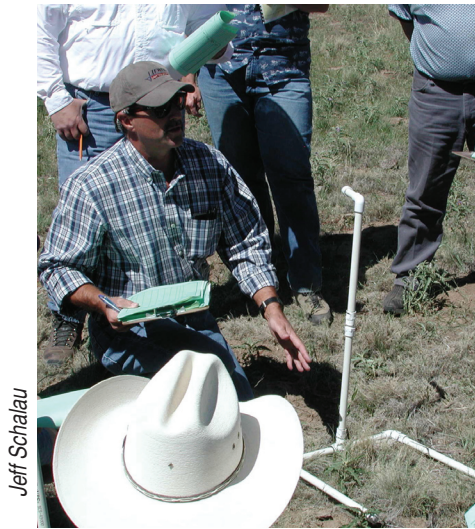
Staying on the cutting edge of land use management research led to the recent unveiling of an “adaptive management plan” at the UA’s Santa Rita Experimental Range 30 miles south of Tucson. The plan focuses on how changes in grazing management can not only improve the condition of the land, but also the health of the animals that graze it.

Following their own advice to clientele, the researchers conducted periodic monitoring on the range before formulating the new plan. They learned that plants are most likely to be harmed by grazing when they are actively growing. (For grazing planning purposes the summer growing season is determined to begin in a particular area when a pasture receives a half-inch of precipitation after June 15.) Thus one aspect of the plan calls for the elimination of year-long grazing to avoid repeated defoliation of individual plants during active growth, according to Ruyle. The strategy is to combine shorter grazing periods with strict cattle rotation, thereby allowing desirable forage plants to rejuvenate.

After months of planning, the research team led by Ruyle initiated the new rotation schedule in fall 2006. The new plan is the latest in a long line of projects designed to integrate research with stakeholder participation and experience when managing rangelands.

“We’re hoping that all of the components of this adaptive management plan—including grazing schedules and computer spread sheets showing plant, soil, climate data and animal characteristics—will aid land use managers statewide in developing not only more precise forecasting but better use of resources,” he says.

Initial stocking rates under the new Santa Rita grazing management process were adjusted after Ruyle and his team



Jeff Schalaus

Rangeland transects are monitored using a standard 40-cm-square “quadrat” which can be easily constructed of PVC pipe. The quadrat is placed on the ground and the presence of plants within the frame is counted and plant and soil surface characteristics (bare, rocky, gravel, etc.) are recorded.

looked at actual use through historic records. They based the new plan’s initial grazing periods on calculations that use a modified version of a grazing plan published by Holistic Management International.

“On the Santa Rita we are looking at estimates of total plant production at the end of the summer growing season as well as at available forage prior to entering each pasture,” Ruyle says. The scientists will also monitor plant regrowth and the potential for regrazing during the growing season. Data collected from monitoring animal movement and distribution patterns, and from how well animals grow under various conditions will further aid the UA team in compiling a more complete picture of how an adaptive management plan might work on individual ranching operations.

“Once data are collected and analyzed,” Ruyle says, “the next step is to extend this model to rancher cooperators to see how it works in the private sector, out in the field.” ❧

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Rangeland Monitoring Programs: Taking Research to the Community

Beginning in 1978 range specialists from the UA began providing hands-on training through the Arizona Cooperative Extension Rangeland Monitoring Program. Since then hundreds of ranchers and natural resource agency personnel have participated in the workshops. George Ruyle, a range specialist in the UA School of Natural Resources, says the educational outreach was triggered by a controversy between the holders of the grazing permits and representatives from the land use and regulatory agencies.

“There was just no good information on Arizona rangeland conditions that could be used to inform the debate,” he says. In the past four or five years the program has been in especially high demand. Participants in Rangeland Monitoring Workshops have learned how to incorporate rangeland trend data when making decisions on how many cattle to move and where. This has resulted in the implementation of rangeland monitoring methods on private, state and public land grazing allotments as well as an increased interest in rangeland monitoring in general.

Based on experience developed through their own monitoring efforts in the field, UA scientists recommend on-the-ground monitoring once a year at the same time every year.

“Fall is the best time because plants are more easily identifiable during that stage of growth,” Ruyle notes. By monitoring annually for a number of years, ranchers learn to spot subtle changes over time. The training focuses on the entire scope of monitoring efforts—“why you monitor, where you might monitor, what kind of things you would select to monitor,” according to Ruyle. “We also include the kinds of soil and vegetative attributes that you would monitor.”

Another educational program called Range 101, Arizona Guide to Range Management and Analysis was assembled in coordination with the Arizona Cattle Growers Association and various land management agencies in Arizona. These workshops present basic concepts that have practical management applications, such as rangeland ecology, soils, animal nutrition and policy issues. By first understanding these concepts, each range manager can then develop individual range management plans for their ranches and grazing allotments and adjust them on an ongoing basis.