Grazing exclosures

When vegetational changes are observed over time, the land manager must determine if they are natural or the result of management practices (e.g., stocking rate). One way to determine this is with grazing exclosures. This method excludes grazing animals from a small, representative area so that vegetational changes outside the cage can be compared to changes inside the cage.

A simple grazing exclosure can be built with four t-posts and wire panels made from 4-inch by 4-inch welded wire or concrete reinforcement wire cut to length. Panels should be at least 4 feet tall. Install the t-posts in a square, with the distance between posts equal to the panel length. Wire the panels to the posts to make a small cage. A cage should be at least 4 feet square.

Once a year, observe the site and record the plant species and amount of bare ground inside the cage. Compare that to land outside the cage. One good way of documenting vegetation in the cage is with photographs. Take pictures of the cage from about 10 feet away so that some area outside the cage is in view for comparison. Also record the types and relative abundance of species within the cage each year. Species inside and outside the cage can be compared over time to determine a trend.

With any monitoring technique it is important to remember the basic indicators of rangeland health. Range health is improving if there is a decrease in bare ground, an increase in the percentages of perennial plants as compared to annuals, a decrease in toxic or unpalatable plants, and evidence of litter accumulation on the soil surface. Range health is declining if there is an increase in bare ground, a decrease in the percentages of perennial plants as compared to annuals, an increase in the number of toxic or unpalatable plants, a loss of litter on the soil surface, and plants sitting on small pedestals of soil.

This publication series was funded by Texas AgriLife Extension Service and the Renewable Resource Extension Act.

Produced by AgriLife Communications, The Texas A&M System
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Issued in furtherance of Cooperative Extension Work in Agriculture and Home Economics, Acts of Congress of May 8, 1914, as amended, and June 30, 1914, in cooperation with the United States Department of Agriculture. Edward G. Smith, Director, Texas AgriLife Extension Service, The Texas A&M System.
2M–Reprint

AgriLIFE EXTENSION
Texas A&M System

L-5454
11/09

Texas Rangeland Monitoring:
Level Two

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Monitoring is an essential tool in rangeland management. Many rangeland managers do a good job of monitoring rainfall received, livestock weaning weights, wildlife harvest, etcetera. However, few monitor the most important resource—the rangeland vegetation that supports the various ranch enterprises.

Monitoring improves the manager's ability to make proper decisions. Rangelands are very complex. Any given pasture may be composed of several different range sites, each with different plant communities. Each plant community supports its own mixture of grasses, forbs and woody species. The proportion and abundance of species changes over time because of weather, seasons, brush and weed management, and grazing pressure from livestock and wildlife. The mix of species and their abundance within each plant community affect present and future production for livestock or wildlife and the health of the rangeland.

The manager must monitor these changes to ensure that management is not causing damage to soil and plant communities and that past decisions are producing desired results. Monitoring is important to long-term ranch sustainability.

The Texas Rangeland Monitoring Program can help the manager measure land health and productivity. It graphically depicts both a snapshot in time and trends over time. It is divided

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into three levels with increasing complexity at each level.

Level one monitors changes in plant communities and soils using permanent photo points. This level requires minimal plant identification skills and requires the least amount of time. It is the starting point for any rangeland monitoring system. Texas AgriLife Extension Service publication L-5216, *Range Monitoring With Photo Points,* describes level one monitoring.

Level two monitoring adds more detail related to rangeland health by documenting and tracking changes in the herbaceous and woody plant communities. Level three monitoring (described in L-5455, *Texas Rangeland Monitoring: Level Three*) adds additional indicators related to ecological processes important to rangeland health.

Level two uses vegetation transects and grazing exclosures to track changes over time in both herbaceous and woody plant communities. The same transects used to install photo points in level one can be used in level two. Transects can be used to monitor the proportion each plant species contributes toward the total plant community, as well as changes in woody plant canopy cover. There are three types of transects; they can be used alone or in combination. Line and step-point transects are best used for monitoring herbaceous plant communities. Belt transects can be used for monitoring the woody plant community.

Line transect

To use a line transect, stretch a 100-foot to 300-foot measuring tape across the monitoring site, carefully orienting the tape north to south or east to west using a compass. Once the line is located, permanently mark each end with a steel fence post. The measuring tape can now be placed in exactly the same location each time the line is used, and relocated easily if a fence post is knocked over or lost. It is also a good idea to obtain GPS coordinates for the line.

To determine herbaceous (grass and broadleaf weeds) plant composition of the site, identify and record the species (name) of the herbaceous plant rooted closest to each foot mark along the line. If using a 300-foot line, every other foot mark may be used. At least 100 plants should be identified and recorded for each line transect installed. The math for calculating species com-position is simple. Suppose 150 plants were identified along a line and little bluestem was recorded 15 times. Divide 15 into 150 to get the percentage composition of little bluestem. In this case it would be 10 percent. Repeat this process for each species recorded.

Woody plant canopy cover also can be determined this way. Simply record the distance (in inches) of canopy directly above the line for each woody plant species. Then divide the distance of each species' canopy cover into the length of the line to figure each species' percent canopy cover. For example, if mesquite had a total of 20 feet of canopy directly over a 200-foot line, the percent canopy cover of mesquite would be 10 percent.

Belt transect

Belt transects are best used to monitor changes in woody plant density (number per acre). Using the line transect established above, count and record by name all woody plants rooted within a set number of feet on either side of the line (usually 3 to 6 feet). For example, if a 300-foot line is used and 12 feet is the width of the belt transect, all woody plants rooted within 6 feet on either side of the line are recorded. The length of the line multiplied by the width equals the square footage of the belt transect. In this example, 300 x 12 = 3,600 square feet.

The second step is to calculate the number of transects that equal one acre. There are 43,560 square feet in an acre. Divide 43,560 square feet by 3,600 square feet and the answer is 12.1. This is the number of belt transects this size that would equal 1 acre. Remember this number. It is important for calculating the density of woody plants within each transect.

Finally, calculate the number of plants per acre for each species found rooted within the belt transect. If 30 redberry juniper were recorded, multiply 30 by 12.1. The result is 363 redberry juniper per acre. Repeat this process for each species recorded.

Step-point transect

Step-point transects are a simple way to collect vegetation data such as diversity and frequency of plant species. This method requires no tape measures or special equipment and is best for herbaceous vegetation and estimating the amount of bare ground and litter. Transects can be read at any time of year, but should be done at the same time each year for consistency. Permanent transect sites should be marked and the transects run in the same direction each year.

Use a t-post to permanently mark the location of the transect. Begin at the t-post and start pacing to the north (it can be in any cardinal direction but should be the same each year). At every other step, record the plant species, bare ground, or litter at the tip of your foot. Complete this process until 100 points are recorded. Then simply add the numbers by species, bare ground and litter. The sum is the percentage. For example, if bare ground was encountered on 36 of the 100 steps, the site is recorded as 36 percent bare ground

Over time you will be able to compare transect results in different years to look for trends. Be sure to take the amount and timing of rainfall into consideration. If the amount of bare ground or undesirable vegetation increases each year and rainfall has been adequate, a change in management should be considered. Likewise, if the composition of desirable species is constant or increasing, management strategies may be adequate. Be careful in interpreting data from one year to the next as rainfall patterns will have a great effect on what species are present and on the amount of litter. It is more reliable to look for trends over several years.