Decision Making Using Monitoring to Manage Grasslands of the Nebraska National Forests and Grasslands Units in the Sandhills

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Livestock grazing is the primary management tool for US Forest Service (USFS) lands in Nebraska, but management philosophies are quite different from typical private ranches in that the primary focus for management is broader than principally livestock production. The USFS generally implements a multiple-use concept for grassland stewardship on the Nebraska National Forest – Bessey Division (90,170 ac) near Halsey, NE and the Samuel R. McKelvie National Forest (116,060 ac) near Valentine, NE. Ultimately, management strives for a diverse plant species composition and a mosaic of grassland structure.

The USFS utilizes four broad goals to guide management of all lands in Nebraska. Goal 1 focuses on ensuring sustainable ecosystems both in terms of health and conservation. This entails improving and protecting watersheds to ensure they are functioning properly from a water quality and quantity perspective. It entails providing ecological conditions to sustain viable populations of native and desired non-native species and to achieve objectives for Management Indicator Species (MIS) such as the plains sharp-tailed grouse and greater prairie-chicken. It entails increasing the amount of forests and grasslands restored to a healthy condition to reduce risk from fire, disease, insects, and invasive species. Goal 2 focuses on multiple benefits to people, thus providing a variety of uses, values, products, and services to the public. Goal 3 focuses on scientific and technical assistance, thus developing the best scientific information to deliver technical and community assistance and to support ecological, economic, and social sustainability. Goal 4 focuses on effective public service, thus providing appropriate access and safety with USFS roads, trails, facilities, and operations.

The Forest Service identifies the Nebraska National Forest – Bessey Division as a geographical area. Another Sandhill geographical area is the Samuel R. McKelvie National Forest near Valentine, Nebraska. These geographical areas give direction for managing grasslands that are specific objectives for managing plant species composition and vegetation structure for the Bessey Division and Samuel R. McKelvie NF. Vegetation structure is visual screening or the height and density of vegetation. The prescriptions for vegetation are related to sustaining healthy ecosystems and meeting the needs of MIS, threatened and endangered species (TES), and other wildlife.

The desired plant species composition objectives for Nebraska National Forest – Bessey Division and Samuel R. McKelvie NF are late seral (30-50%), late intermediate seral (30-50%), early intermediate seral (1-20%), and early seral (1-20%).

1. In the early seral stage, the sands and choppy sands ecological sites will be dominated by sand bluestem and little bluestem will be the codominant species. Prairie sandreed, hairy grama, switchgrass, sedges and sand lovegrass are also important grasses in the early seral stage. On the more productive dry valley ecological sites, blue grama will be the dominant species while sedges will be the codominant species. Prairie sandreed, sand bluestem, switchgrass, sand lovegrass, and little bluestem are also important grasses on dry valley sites.
2. In the early intermediate seral stage, the sands and choppy sands ecological sites will be dominated by hairy grama while little bluestem will be the codominant species. Sand bluestem, sedges, prairie sandreed, switchgrass, and sand lovegrass are also important species in the early intermediate seral stage of the sand and choppy sands ecological sites. On the more productive dry valley ecological sites, sedges will be the dominant species while blue grama will be the codominant species. Little bluestem, switchgrass, prairie sandreed, sand bluestem, and hairy grama are also important grasses on dry valley sites.
3. In the late intermediate seral stage, the sands and choppy sands ecological sites will be dominated by little bluestem and sand lovegrass will be the codominant species. Sand bluestem, sedges, prairie sandreed, hairy grama, and switchgrass are also important grasses in the late intermediate seral stage. On the more productive dry valley ecological sites, little bluestem will the dominant species while sedges will be the codominant species. Switchgrass, blue grama, sand bluestem, hairy grama, and neddleandthread are also important grasses on dry valley sites.
4. In the late seral stage, the sands and choppy sands ecological sites will be dominated by sand bluestem while switchgrass will be the codominant species. Sand lovegrass, sedges, little bluestem, prairie sandreed, and blue grama are also important species in the late seral stage. On the more productive dry valley ecological sites, switchgrass will be the dominant species while sand bluestem will be the codominant species. Little bluestem, prairie sandreed, needleandthread, blue grama, and sedges are also important species on dry valley sites.

The two geographic areas are managed to meet vegetation structure objectives of 40-60% high structure, 40-60% moderate structure, and 0-5% low structure. High vegetation structure can be achieved on moderate and highly productive soils dominated by mid and/or tall grasses (late or late intermediate seral stage composition). Grasslands on moderate to highly productive soils but dominated by short grass species generally do not have the capability to provide high vegetation structure unless management is changed to increase the composition of mid to tall grass species over a period of years or decades.

Moderate structure can be achieved on moderated to highly productive soils dominated by mid and/or tall grasses depending on grazing use levels. Grassland dominated by short grass species will not achieve moderate structure regardless of grazing levels.

Minimally productive soils, prairie dog colonies, and grassland areas grazed by livestock at high intensities provide low structure. Low vegetation structure can result from a dominance of low stature plant species or from heavy utilization of mid and tall grasses.

A similarity index is used as the monitoring method for determining species composition objectives. A similarity index is a comparison of the present plant community on an ecological site with the kinds, proportions, and amounts of plants in other vegetation states possible on the site. The present plant community is compared to reference plant communities. As an example, in a choppy sands ecological site (MLRA 65), four reference plant communities would be Sand Bluestem (Historic Climax Plant Community), Bluestem/Prairie Sandreed (e.g., result of continuous summer grazing), Blowout Grass/Sandhill Muhly (e.g., result of continuous heavy grazing), and Excessive Litter (e.g., result of no grazing or no fire) plant communities. A similarity index to historic climax plant community is defined as the present state of vegetation on an ecological site in relation to the historic climax plant community for the ecological site. It is expressed as the percentage, by weight, of the historic climax plant community. The similarity index to historic climax reflects change over time and is the result of how climate and management activities have affected the plant community. Similarity index sampling follows a 100-foot transect utilizing tools such as a measuring tape for transects, clippers for vegetation collection, bags for collected vegetation, scales for obtaining weight of collected samples, and clipping ring that provides a representative sample which can be converted to species composition per acre.

Vegetation structure is evaluated by using a modified Robel pole and/or photo-guide that was developed by USFS. A Robel pole is a one-inch pole containing alternating gray and white one inch bands. The pole provides a visual obstruction reading (VOR) or measures the height and density of vegetation by looking down through the vegetation from four meters away and one meter high and recording the last band visible. Approximately ¼-mile transects are conducted in the spring with 20 stations each and Robel pole readings taken from each of the cardinal directions. Ecological sites are separated into hills (sands and choppy sands ecological sites) and valleys (sub-irrigated, sandy, sandy lowland ecological sites) with VOR objectives to meet needs for MIS species. The standard for high structure in the hills is 2.0 or more inches, moderate structure is 1.5-1.9 inches, and low structure is less than 1.5 inches. The standard for high structure in the valleys is 3.0 inches or more, moderate structure is 2.0-2.9 inches, and low structure is less than 2.0 inches.

Photos were taken at the beginning and end of each vegetation structure transect, thus providing a pictorial view of vegetation to correlate with the overall mean VOR of the transect. A photo-guide key was developed that represents low, moderate, and high cover for both hills and valleys from the photos. The photo-guide is currently used to rate each pasture within an allotment to determine if the allotment is meeting vegetation structure objectives. It is a less time consuming method to determine vegetation structure levels, thus more area can be evaluated on an annual basis for all allotments to make management decisions.

The Nebraska National Forest – Bessey Division and Samuel R. McKelvie NF employ an array of grazing systems from season-long use to multi-pasture rotations. Through vegetation monitoring and evaluation of results of sampling for each pasture within an allotment, adjustments to grazing management can be made to maintain or trend toward desired conditions. This is an adaptive management approach, which is the process of making use of monitoring information to determine if management changes are needed, and if so, what changes and to what degree. Many management actions are available to move resource conditions in appropriate directions. These include:

1. Change the grazing system.
2. Adjust stocking rate.
3. Do not graze in June or July in consecutive years.
4. Adjust turn-on date.
5. Do not allow grazing duration to exceed 45 days per pasture.
6. Incorporate periodic rest (e.g. non-use for 12 or more months).
7. Relocate, add, increase capacity of, or remove existing water development (e.g. pipeline, tanks, windmills, wells).
8. Relocate, add, or remove existing fence line (e.g. electric, standard, permanent or temporary).
9. Early spring grazing.
10. Change the grazing season (e.g. dormant season grazing).