Protocols for Developing Pasture States

A. **Step 1.—Evaluate and Revise Existing Forage Suitability Group Information**

Forage suitability group descriptions (FGSDs) are currently stored in the NRCS FSGD online database system or within individual State electronic Field Office Technical Guide. Ecological site development guidance is contained in the National Ecological Site Handbook (NESH). FSG information can be integrated into existing ecological site descriptions at any stage (provisional, approved, and correlated). For major land resource areas (MLRAs) that have provisional or approved ecological site descriptions (ESDs), editing of the existing state and transition model (STM)and potentially other sections may be required to accommodate pasture state information. Adapted species, production, growth curves, and management interpretations are the only sections within existing FSGs that are required to be transferred into corresponding ESDs. If necessary, multiple plant communities within a pasture state may be used to describe differences in species, mixes, fertility regimes, irrigation or other management options. In unusual cases, there may be need for multiple pasture states on a single ecological site (e.g., irrigation versus dryland).

B. **Step 1a.—Develop Provisional Ecological Sites**

For MLRAs that do not have pasture information, provisional ecological sites must be developed first. Ideally, information relevant to pasture management will be an important part of defining and correlating ecological sites.

C. **Step 2.—Develop Pasture State Attributes and Interpretations for Ecological Sites for the Major Land Resource Area**

(1) Development of FSG concepts have largely been accomplished by sorting soil map unit components into groups that have similar environmental features, that provide a predictable growing environment for forage plants. However, each MLRA and land resource unit (LRU) throughout the United States is unique and limiting groupings based on one set of environmental variables may not produce consistent results.

(2) A multifactorial approach to describing pasture states can provide a robust and flexible means of grouping soil attributes and interpreting management options. Ordination using software programs capable of conducting multivariate analyses can be helpful in organizing variables for vegetation pattern, hydrology, plants, sedimentation, and other factors influencing an ecological site.

D. **Step 3.—Correlate ESDs and Populate the Pasture State Interpretations**

(1) Pasture state management information is documented within the narrative sections of the ESD and STM and the management interpretations and contains four primary sections:

(i) **Adapted Forage Species List**.—Indicate which forage species are best adapted to the soil and climatic conditions stated in the ESD. Species should be listed by the common and scientific names. To increase usefulness of this list, consider listing commonly formulated forage mixtures as well. Forage mixtures listed should contain only those species adapted to the soil conditions stated in the report.

(ii) **Production Estimates**.—Estimate total annual yields of the forages and forage mixtures listed. Estimates should be based on soil conditions presented in the ESD and the various levels of management achievable under those conditions. For further guidance on forage production estimates, see the National Range and Pasture Handbook.

(iii) **Growth Curves**.—For pastured forages, display their growth curve or seasonal distribution of production or availability if reliable data are available for the MLRA or

LRU being represented. Combine species with similar seasonal distribution of growth data to cut down on redundancy and data display. If the same growth curve is used for one species, identify all species having this common growth curve.

(iv) **Management Interpretations**.—Information in this section is used to plan use and management of soils for forage crops or pasture. This section conveys the importance of all soil and climate data presented at first in the ecological site description. Soil limitations that will adversely affect forage production or impact management flexibility should be included in this section. Management interpretations are based on soil and climatic conditions described in the ESD and whether forage is grazed or mechanically harvested. Management interpretations will be primarily agronomic and grazing, but may include some agricultural engineering interpretations when appropriate. Statements made in this section should be concise and accurate, but remain generic. If a management measure needs to be qualified, cite an existing job sheet that goes into more detail.

(2) **Examples of Soil Limitations**

(i) Acidic or alkaline soils will reduce most forage yields unless corrected with soil amendments that correct pH to a range acceptable for the desired species.

(ii) Slope steepness may require more involved fencing layouts and more frequent watering facilities to distribute grazing pressure evenly. Slope may also limit the ability to lime and fertilize fields.

(3) **Examples of Agronomic Interpretations**

(i) Seedbed preparation needs influenced by soil and climatic limitations.

(ii) Planting depths influenced by soil and climatic limitations.

(iii) Planting timing influenced by soil and climatic limitations.

(iv) Soil fertility recommendations based on soil cation exchange capacity, native fertility, pH, salinity and rainfall patterns.

(v) Forage crop harvest alternatives based on climatic constraints.

(vi) Specific choice lists of forage species for pasture planting due to soil restrictive layer depths.

(4) **Examples of Grazing Management Interpretations**

(i) Deferring grazing to avoid compacting wet soils.

(ii) Deferring use of wet soils until dry or drought conditions occur.

(iii) Deferred grazing during periods of susceptible high shrink-swell soils.

(iv) Deferring excessively drained soils for grazing during excessively wet periods.

(v) Suggested modifications to pasture layouts because of slope steepness or irregular terrain.

(vi) Suggested modifications to pasture layouts because of distance to drinking water based on terrain.

(vii) Altering input methods of soil amendments or pipeline on soils with severe or greater stoniness.

(5) **Examples of Agricultural Engineering Interpretations**

(i) Fence design modifications required due to soil depth or terrain features.

(ii) Irrigation alternatives and modifications based on soil and climate requirements or topographic position.

(iii) Drainage design alternatives of seasonally wet soils not considered to be wetlands.

(iv) Altering pipeline installation, operation, and maintenance on soils with severe restrictive layers.