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To: All Field Officials

From: Director, National Science and Technology Center

Subject: Methods for Determining Plot-Based Aboveground Vegetation Production

Three methods for estimating aboveground vegetation production are presented on pages 37 to 41 in Technical Reference 1734-7 (hereinafter referred to as TR approach), Ecological Site Inventory, published in 2001. Two of these three methods are also presented on pages 102 to 115 in Technical Reference 1734-4, Sampling Vegetation Attributes, published most recently in 1999. These methods are each plot-based. For each of these methods, direction is given to include current-year portions of plants lying within the vertical projections of the plot boundary in the production estimate, and conversely, all portions of plants lying outside the plot boundary are excluded (see Figure 4 on page 37 in Technical Reference 1734-7).

The Natural Resources Conservation Service (NRCS), on pages 4-4 to 4-7 in the 1997 National Range and Pasture Handbook, presents a different approach. The NRCS directs that plants with bases which originate within the plot boundary are identified, and current-year portions of these plants are included in the production estimate, even if some of these portions lie outside the plot boundary. Conversely, plants with bases which originate outside the plot boundary might have portions which lie within the vertical projections of the plot boundary, but these portions are not included. This approach is also presented in BLM's National Range Handbook, H-4410-1 (hereinafter referred to as Handbook approach), published most recently in 1984 (see Exhibit 604.3(e)(1) in H-4410-1).

There is inconsistency between the TR approach and the Handbook approach. The change made by the BLM in Technical References 1734-4 and 1734-7 was to provide an alternative approach for estimating aboveground vegetation production for field use across ecological sites dominated by grasses, forbs, or shrubs. A perusal of literature and professional judgment of rangeland scientists on the subject of sampling of vegetation production provide evidence that neither approach of estimating vegetation production is incorrect. National Academy of Sciences—National Research Council (1962), Mueller-Dombois and Ellenberg (1974), Pieper (1978), Cook and Stubbendieck (1986), and Elzinga et al. (1998), all contain discussions about sampling methods for estimating vegetation production, but none disclose detailed information on which portions of plants should be associated with the plot area. Ruyle (1997), however, recommends the same approach as that found in the TR approach.

The strengths and weaknesses of each approach are somewhat related to the life form of vegetation which is being estimated across an existing vegetation type. For vegetation types dominated by grasses and grass-like plants, the Handbook approach would appear to be the stronger approach. Grass tissue can droop with moisture stress and can become more erect when hydrated. Movement of grass tissue in this manner can affect the amount of tissue lying within the vertical projections of the plot boundary, if the TR approach is used. This problem would not surface using the Handbook approach because the entire portion of the plant is estimated, even if a portion of the plant lies outside the plot boundary, as long as the plant is rooted within the plot area.

For vegetation types where shrubs are prevalent, the TR approach would appear to be the stronger approach. There can be instances where shrub individuals can be rooted within a plot boundary, yet very little of the aboveground production can actually lie within the vertical projections of the plot boundary. Using the Handbook approach in this instance, the amount of aboveground production associated with the plot area would be overestimated.

For vegetation types where tall shrubs and trees, for example, pinon and juniper are prevalent, aboveground vegetation production methods are generally not suitable (Ruyle 1997). Using the TR approach, the vertical projections of the plot boundary must be visually projected upward, which is comparatively more difficult than visually projecting the plot boundary downward. The Handbook approach still suffers here as well because tall shrubs and trees can be rooted within the plot boundary, yet most of their aboveground production can lie outside the plot area.

In summary, neither of the two approaches is solely the preferred choice. Each approach, if used to estimate vegetation production for an existing vegetation type, is likely similar in accuracy. **An important consideration with either approach is consistency in use over time and data standardization.** With renewed interest in FY 2002 from Congress on devising standardized monitoring and assessment methodologies, there might be a need to further refine these approaches to achieve a greater degree of consistency between agencies. Until such time, recommendations are to: (1) continue using the Handbook approach if the Handbook approach has been the traditional choice, and if data sharing or sharing data collection responsibility with the NRCS has been commonplace or (2) continue using the TR approach if the TR approach has been the traditional choice.

If you have any questions regarding this information bulletin, please contact Mike “Sherm” Karl at (303) 236-0166.

Signed by:
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Authenticated by:
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1 Attachment
1 – References (1 p)

Distribution
ST-150, BLM Library

References

- Cook, C.W., and J. Stubbendieck. 1986. Range research: basic problems and techniques. Society for Range Management, Denver, CO. 317 pp. + introduction.
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- Mueller-Dombois, D., and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley & Sons, New York. 547 pp.
- National Academy of Sciences—National Research Council. 1962. Basic problems and techniques in range research. Publication No. 890. Washington, D.C. 341 pp. + introduction.
- Pieper, R.D. 1978. Measurement techniques for herbaceous and shrubby vegetation. New Mexico State University, Las Cruces. 148 pp.
- Ruyle, G.B. (editor). 1997. Some methods for monitoring rangelands and other natural area vegetation. Arizona Cooperative Extension Publication 190043, Cooperative Extension, College of Agriculture, The University of Arizona, Tucson.