

## C. Dry Weight Rank Method

1. *General Description* The Dry Weight Rank method is used to determine species composition. It consists of observing various quadrats and ranking the three species which contribute the most weight in the quadrat.  
  
It is important to establish a photo plot (see Section V.A) and take both close-up and general view photographs. This allows the portrayal of resource values and conditions and furnishes visual evidence of vegetation and soil changes over time.
2. *Areas of Use* This method has been tested in a wide variety of vegetation types and is generally considered suitable for grassland/small shrubs types or understory communities of large shrub or tree communities. It does not work well on large shrubs and trees.
3. *Advantages and Limitations*
  - a One advantage of the Dry Weight Rank Method is that a large number of samples can be obtained very quickly. Another advantage is that it deals with estimates of production, which allows for better interpretation of the data to make management decisions. It can be done in conjunction with frequency, canopy cover, or comparative yield methods. Because it is easier to rank the top three species in a quadrat, there is less observer bias.
  - b The limitation with this technique is that, by itself, it will not give a reliable estimate of plant standing crop, and it assumes there are few empty quadrats. In many large shrub or sparse desert communities, a high percentage of quadrats are empty or have only one species present. The quadrat size required to address these concerns is often impractical.
4. *Equipment* The following equipment is needed (see also the equipment listed in Section V.A, page 31, for the establishment of the photo plot):
  - Study Location and Documentation Data form (see Appendix A)
  - Dry Weight Rank form (see Illustration 8)
  - Quadrat frame
  - Hammer
  - Permanent yellow or orange spray paint
  - One stake: 3/4 - or 1-inch angle iron not less than 16 inches long
  - Compass
  - Steel post and driver
5. *Training* Examiners must be able to identify the plants. Experience in weight estimate is desirable, but those with experience must break the habit of assigning percentages and just rank the species, as well as not debating over the close calls. The large number of sampling units tends to reduce the problems with close calls.
6. *Establishing Studies*
  - a **Site Selection** The most important factor in obtaining usable data is selecting representative areas (critical or key areas) in which to run the study

(see Section II.D). Study sites should be located within a single plant community within a single ecological site. Transects and sampling points need to be randomly located within the critical or key areas (see Section III).

- b Pilot Studies** Collect data on several pilot studies to determine the number of samples (transects or observation points) and the number and size of quadrats needed to collect a statistically valid sample (see Section III.B.8).
  - c Selecting Quadrat Size** Adapt the size and shape of quadrats to the vegetation community to be sampled.
    - (1) Select a plot size on the premise that most plots should contain three species.
    - (2) Determine the proper size quadrat to use by doing preliminary sampling with different size frames (see Illustration 6).
    - (3) Use the same size quadrat throughout a study and for rereading the study. If frequencies approach the extremes of either 0 or 100 percent, it may be necessary to change the quadrat size.
  - d Number of Studies** At least one Dry Weight Rank study should be established on each study site, depending on the objectives; establish more if needed (see Sections II.D and III.B). Evaluate the rangeland plant communities where studies will be located and determine the number of transects and quadrats needed. The purpose is to collect the best possible sample for the greatest number of species in any plant community.
  - e Study Layout** The Dry Weight Rank data can be collected using the baseline, macroplot, or linear study designs described in Section III.A.2 beginning on page 8. The linear technique is the one most often used.
  - f Reference Post or Point** Permanently mark the location of each study with a reference post and a study location stake (see beginning of Section III).
  - g Study Identification** Number studies for proper identification to ensure that the data collected can be positively associated with specific sites on the ground (see Appendix B).
  - h Study Documentation** Document pertinent information concerning the study on the Study Location and Documentation Data form (see beginning of Section III and Appendix A).
- 7. Taking Photographs** The directions for establishing photo plots and for taking close-up and general view photographs are given in Section V.A.
- 8. Sampling Process** In addition to collecting the specific study data, general observations should be made of the study sites (see Section II.F).

Determine the transect bearing and select a prominent distant landmark such as a peak, rocky point, etc., that can be used as the transect bearing point.

After the quadrat location has been determined, the observer decides which three species in the quadrat have the greatest yield of current year's growth on a dry matter basis. The species with the highest yield is given a rank of 1, the next 2, and the third highest a 3. Data are record by quadrat on the Dry Weight Rank form, Illustration 8. All other species present are ignored. If there are not three species present in the quadrat, a multiple rank is assigned.

The Dry Weight Rank method assumes that a rank of 1 corresponds to 70% composition, rank 2 to 20%, and rank 3 to 10%. If only one species is found in a quadrat, it would be ranked 1, 2 and 3 (100%). If two species are found, one may be given ranks of 1 and 2 (90%), ranks 1 and 3 (80%), or ranks 2 and 3 (30%), depending on the relative weight for the two species (see Illustration 8). For each species, record the number of 1, 2, or 3 ranks received in the sample.

Data can also be collected and recorded for each quadrat for use in conjunction with the Comparative Yield Method.

## 9. *Calculations*

- a For each species multiply the number of ranks of 1, 2, and 3 by 7, 2, and 1, respectively, and record under the appropriate weight column. Add the amounts in the weight columns of each species and record in the weighted column.
- b Total the weighted column for all species. The total of this column will always be ten times the number of quadrats.
- c Divide the value recorded for each species in the weighted column by the total of the weighted column to get percent composition for each species. Percent composition, by definition, should total 100 percent.

10. *Data Analysis* Chi Square analysis can be used to determine if the frequency of each species in each rank tally group (1,2, or 3) has changed from one sampling period to another. Each species must be analyzed separately.

## 11. *References*

Despain, D.W., P.R. Ogden, and E.L. Smith. 1991. Plant frequency sampling for monitoring rangelands. In: G.B. Ruyle, ed. Some Methods for Monitoring Rangelands and other Natural Area Vegetation. Extension Report 9043, University of Arizona, College of Agriculture, Tucson, AZ.



# Dry Weight Rank

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| Study Number      |   | Eagle Creek #1              |   | Date |   | 8/16/95 |   | Examiner |   | Joe Smith |    | Allotment Name & Number |    |    |    |    |    |    |    |    |    | Eagle Creek 10101 |   | Pasture      |          | 1       |  |  |  |  |  |  |  |               |  |
|-------------------|---|-----------------------------|---|------|---|---------|---|----------|---|-----------|----|-------------------------|----|----|----|----|----|----|----|----|----|-------------------|---|--------------|----------|---------|--|--|--|--|--|--|--|---------------|--|
| Transect Location |   | 3 miles west of Border Tank |   |      |   |         |   |          |   |           |    | Number of Quadrats      |    |    |    |    |    |    |    |    |    | 20                |   | Quadrat Size |          |         |  |  |  |  |  |  |  | 40 cm x 40 cm |  |
| Species           |   | Quadrat                     |   |      |   |         |   |          |   |           |    |                         |    |    |    |    |    |    |    |    |    | Rank Tally        |   |              | Weighted | % Comp. |  |  |  |  |  |  |  |               |  |
|                   |   | 1                           | 2 | 3    | 4 | 5       | 6 | 7        | 8 | 9         | 10 | 11                      | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 1                 | 2 | 3            |          |         |  |  |  |  |  |  |  |               |  |
| BOER4             | 1 | 1                           |   |      | 1 |         |   |          | 1 |           | 1  |                         | 1  |    |    |    |    |    |    | 1  |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             | 2 | 2    |   | 2       |   | 2        |   |           |    |                         |    |    |    |    | 3  |    | 2  |    |    | 8                 | 5 | 2            |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             |   |      | 3 |         |   |          |   |           |    |                         |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
| HIBE              |   |                             | 1 | 1    |   | 1       |   |          |   |           |    |                         |    |    |    |    |    | 1  |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
|                   | 2 |                             |   |      |   |         |   |          |   |           | 2  |                         |    | 2  |    | 2  | 2  |    |    |    | 4  | 5                 | 6 |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             | 3 |      |   | 3       |   |          | 3 |           | 3  |                         | 3  |    | 3  |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
| BOGR              |   |                             |   |      |   |         |   | 1        |   | 1         |    |                         |    |    |    | 1  |    |    |    |    | 4  | 1                 | 6 |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             |   |      |   |         |   |          |   |           |    | 2                       |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   | 3                           |   | 3    |   |         |   |          |   |           |    |                         |    | 3  |    |    |    | 3  |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
| BOCU              |   |                             |   |      |   |         | 1 |          |   |           |    |                         |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   | 2                           |   |      |   | 2       | 2 |          | 2 | 2         |    |                         |    |    |    |    |    |    | 3  |    | 1  | 6                 | 1 |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             |   |      |   |         |   |          |   |           |    |                         |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
| LUPIN             |   |                             |   |      |   |         |   |          |   |           |    |                         |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             |   |      | 2 |         |   |          |   |           |    |                         |    |    | 2  |    |    |    |    |    | 0  | 2                 | 5 |              |          |         |  |  |  |  |  |  |  |               |  |
|                   | 3 |                             |   |      |   |         | 3 | 3        |   | 3         |    | 3                       |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
| HAGR              |   |                             |   |      |   |         |   |          |   |           |    | 1                       | 2  |    |    |    | 1  |    |    |    | 3  | 1                 | 0 |              |          |         |  |  |  |  |  |  |  |               |  |
|                   |   |                             |   |      |   |         |   |          |   |           |    |                         |    |    |    |    |    |    |    |    |    |                   |   |              |          |         |  |  |  |  |  |  |  |               |  |
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Observations/Comments