PLANT COMPOSITION

I. What is Composition?

The proportions (%) of various plant species in relation to the total on a given area. It may be expressed in terms of relative cover, relative density, relative weight, etc.

II. Why Measure Composition?

A. Traditional range guides for proper stocking rates and range condition are based on plant composition and the classic range succession theory

B. Measurement of composition over time is used to characterize range trend

C. Gives an indication diversity and dominance in the plant community

D. Necessary to estimate the forage available for animals with different feeding habits

E. Species composition is expressed as % of total community; this is easy to understand. Composition is an attribute can be more easily visualized by those unfamiliar with rangelands or the range of that area

F. On rangelands, composition change is usually gradual process resulting from disturbance in the following general format:

1st: decrease in the plants that are the most preferred plants

2nd: decrease in the plants that are physiologically and anatomically most susceptible to disturbance

3rd: increase in the less preferred or more resistant individuals

4th (and/or simultaneous with above steps): invasion of new species (often annuals followed by herbaceous or woody perennials of low grazing value)

5th: disappearance of climax plants

III. When to Measure Composition?

A. it depends on your range community, your objectives, what method you are using, and your schedule

B. because cool season plants (especially forbs) develop early, dry up and blow away before warm season plants have reached their full size for the year it is difficult to accurately measure only once in a mixed cool/warm season community so may have to take two measurements in a year

C. management factors also affect measurement timing

IV. How to Measure Composition?

There are many methods and techniques for measuring composition

A. **Using frequency data:**

Frequency is generally regarded as an unsuitable basis for the description of species composition, because simply recording the presence of a species does not indicate its absolute amount.

B. **Using density data:**

$$\%\,Composition\ Spp\ A = \left(\frac{\#of\ Spp\ A}{Total\ \#individuals} \right) \times 100$$

C. **Using biomass data:**

$$\%\,Composition\ Spp\ A = \left(\frac{Total\ wt.\ of\ Spp\ A}{Total\ wt\ of\ all\ species} \right) \times 100$$

D. **Using cover data:**

$$\%\,Composition\ Spp\ A = \left(\frac{\%\ \text{cov.}of\ Spp\ A}{\sum \text{cov.}\ for\ all\ species} \right) \times 100$$

E. Using dry weight rank procedure (works well with grasses)

1. For each species:

   multiply number of 1st ranks by 7, 2nd ranks by 2, and 3rd ranks by 1
2. Sum that total for each species (this is the weighted rank for the species)
3. Sum weighted ranks for all species

$$\%\,Composition\ Spp\ A = \left(\frac{Weighted\ rank\ for\ Spp\ A}{\sum Weighted\ ranks\ for\ all\ species} \right) \times 100$$

V. Considerations to be given before and during a monitoring and evaluation effort

A. These are especially important if composition data will be used to monitor range trend (changes in range condition over time) because in order to be able to compare data collected in different years, the methods of collection must be comparable each year. These guidelines help the manager plan monitoring efforts so that a study can achieve its purpose.

B. Determine data use; for example, the monitoring of change in production of forage plants for wildlife. Then forage species must be identified initially.

C. Determine the measure needed. If measurement of cover is to be made, then will litter also be considered as to change over time? Selection of a set of measures to be made will determine the cost of the monitoring effort. Therefore, select the meaningful measures only.

D. Determine level of sensitivity to detect a change in vegetation. Changes in biomass of minor individual, but ecologically important species are detected only if data are collected for these individual species; the tendency is to collect such data for commonly occurring species in a monitoring program which may not provide significant results.

E. Determine the level of accuracy needed. Close estimates of density to actual values may be needed to detect a change in the abundance of species for a general community description.

F. Select techniques to be used without change for the duration of the monitoring effort. Comparability of data can be made only if techniques provide comparable data. For instance, change in plot size and/or shape may alter comparability of data collected. (Bonham p. 270)

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