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FOR 460.01: Range Inventory and Analysis

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INVENTORY AND ANALYSIS

The major objective of this course is to introduce methods and techniques used to describe plant communities. We will use the Teller Wildlife Refuge as an outdoor laboratory for discussion, designing a monitoring methodology, and for categorization of the area. Our main study area will be a site where a wetland enhancement is being initiated. As the class is a small class, I will attempt to allow some flexibility in individual student objectives. However, I believe all students should have a thorough understanding of vegetation measurements used to define plant communities, monitor changes associated with time (or treatments applied), as well as quantifying and/or qualifying vegetation and habitat for different uses and values. In any inventory of a site there may be several techniques used to describe the attributes of the vegetation. We will discuss problems inherent in analysis of plant communities or sites, possible methods used to describe sites and plant communities, and the advantages and disadvantages of some of the methods.

The quantitative features of plants or plant communities that can be most readily measured are: 1) weight or biomass 2) cover or area, 3) numbers, and 4) height or length or diameter. Weight, cover and number are the measurements used most by vegetation ecologist. Measurements of the quality of the vegetation are those making possible evaluation of the quality of forage produced or its value to animals. These are 1) preference of forage species to grazing animals, 2) nutrient content, and 3) digestibility. There are likewise a number of ways to categorize sites according to potential vegetation and current ecological site conditions. We will discuss ecological site theory and aspects of condition and trend. As stated previously I want to allow flexibility in the class to allow students to specialize in an area that they want to research or discuss. For example, the wetland enhancement that is occurring is an exercise to restore the area to a more desired state. What is that desired state? How do we identify that desired state? Can we enhance the plant community by developing a restoration planting? These questions may be answered in the class or may involve some additional "independent" study.

GRADING:

Grades will be based on lecture tests, exercises and class participation. Lecture tests. Two lecture tests and the final exam will constitute 70 % of your final grade. The final exam will be comprehensive. Exercises. You will have a number of assignments that will constitute 20% of your final grade. I will reserve 10% for class participation. A +/- grading system will be used according to the University policy.

NO REQUIRED TEXT: Readings and lecture notes will be provided:

SUPPLEMENTAL TEXT

Elzinga, C.A., D.W. Salzer, J.W. Willoughby. 1998. Measuring and monitoring plant populations. Technical Reference 1730-1. BLM/RS/ST-98/005+1730. 496 p.

National Applied Resource Sciences Center, Bureau of Land Management, ed. 1996. Sampling Vegetation Attributes, Interagency Technical Reference. Technical Reference 1734-4. BLM/RS/ST-96/002+1730. <http://www.blm.gov/nstc/library/techref.htm>

National Applied Resource Sciences Center, Bureau of Land Management, ed. 1996. Utilization Studies and Residual Measurements, Interagency Technical Reference. Technical Reference 1734-3. BLM/RS/ST-96/004+1730 <http://www.blm.gov/nstc/library/techref.htm>

U.S. Department of Agriculture, Grazing Lands Technology Institute. 1997. National Range and Pasture Handbook. (www.ftw.nrcs.usda.gov/glti).

U.S. Department of Agriculture, Grazing Lands Technology Institute. 2000. Interpreting Indicators of Rangeland Health. . (www.ftw.nrcs.usda.gov/glti)

INTEGRATED RANGELAND RESOURCES MEASUREMENTS

Lecture Notes

I. INTRODUCTION

- A. Rangelands, their value and integration with other ecosystems
- B. The increasing complexity of ecosystem management

II. The foundation of ecosystems: Assessment of Climate, Soils, Physiography

III. Methods of Studying Vegetation (from *Sampling Vegetation Attributes* and Utilization Studies and *Residual Measurements*)

A. Quantitative Features

1. Cover
2. Numbers (density, frequency, and abundance)
3. Weight (production and productivity)
4. Height/Length
5. Utilization
6. Species diversity

B. Qualitative Features

1. Preference
2. Digestibility
3. Nutrient content

IV. Sampling Range Vegetation

- A. Purpose of Sampling
- B. Populations, parameters, and statistics

V. Statistical Methods

- A. Comparison of samples using interval estimates
- B. Hypothesis testing
 1. T-test
 2. F-test

V. Plot shape, size and number

VI. Habitat Descriptions and Classifications

- A. Range sites and ecological sites
- B. Habitat types
- C. Community types and Riparian types
- D. Range condition and trend
- F. Non-equilibrium theory

VII. Habitat Monitoring