

## VEGETATION DISTRIBUTION IN BADLANDS NATIONAL PARK

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### Abstract

This study concerns the vegetation distribution in habitat types of Badlands National Park, South Dakota. Phase I of the study is that of reconnaissance and determining potential habitat types present. Phase II includes intensive sampling of sites which represent minimally disturbed vegetation. Sites on more disturbed vegetation also will be established. Phase III will include mapping of habitat types and additional sampling to fully substantiate results of Phase II. Study sites established in the Park should be thought of as long-term monitoring sites at which effects of animal grazing, climate changes and fire can affect the vegetation.

### Introduction

The purpose of this study is to determine the distribution of vegetation types in Badlands National Park, South Dakota, and to describe the types in both pristine and disturbed condition. Additionally, special reference is given to the occurrence and distributions of exotic species, as well as any rare and endangered species encountered in the study.

It is feasible and worthwhile to establish permanent sampling sites in the Park. These should include least disturbed to highly disturbed sites. Least disturbed sites will form the standard of reference against which to measure changes that occur as a result of heavy use and changes that occur with recovery after cessation of heavy use (Moir 1972). These permanent sites can be monitored by Park personnel; they can also be reexamined later by the principal investigator. Permanent sites also provide the basis for evaluating hypotheses about native vegetation. Hypotheses can include long-term climatic gradients, short-term weather fluctuations, one-time bison grazing, human-introduced chemicals, fire, etc. The list is long but it is important to think in terms of valid ecological hypotheses.

The initial phase centers on a complete reconnaissance of the area to establish a list of potential habitat types (sensu Daubenmire 1968) and the disturbance types. The initial phase also includes examination of the plant collection of the Park herbarium for any corrections or changes that are required.

The second phase centers on intensive sampling of the vegetation to

obtain quantitative data, and to establish the permanent sampling sites.

The third phase centers on a trial at mapping the habitat types and showing disturbance types with transparent overlays. This work will be done in one of the Park Service offices. The work will be substantiated by continued field work as needed to complete that phase (II) of the study.

To date, most of Phase I (1988-89) has been completed.

### Methods

Reconnaissance - A thorough examination of the study region is done to determine the potential habitat types present. This phase of the study allows the principal investigator to learn much about the geographic extent of the vegetation types present, and the general condition of those types. The map on p. 5 shows generally the location of the North Unit of the Park. The South Unit of the Park was visited during Phase I and it is generally quite disturbed. Much of the land is presently being grazed by domestic cattle. There are a few isolated buttes which will be sampled during Phase II. These buttes are isolated and except for some haying, little else has been done to disturb the native vegetation.

Quantitative Sampling - Study sites are established and quantitative (coverage) data are gathered for plant species at each site. The method of canopy coverage analysis follows that of Daubenmire 1959, 1968, 1970, Daubenmire and Daubenmire 1968). This aspect of the study characterized Phase II. Phase II occurs during 1989-90.

Map construction - Part of Phase III (1990-91) will be devoted to mapping habitat types of the North Unit. Transparent overlays will be made to show current disturbed vegetation. This approach to vegetation study has been done by U.S. Forest Service personnel and by some academic scientists. There appears to be considerable long-term usefulness to the method.

### Results and Discussion

To date some of the habitat types have been identified though the extent of their geographic distributions is currently incompletely known. Some of the major habitat types are as follows:

Agropyron smithii/Carex filifolia  
Agropyron smithii/Carex eleocharis  
Stipa comata/Agropyron smithii  
Stipa viridula/Agropyron smithii  
Stipa comata/Carex eleocharis  
Stipa comata/Carex filifolia

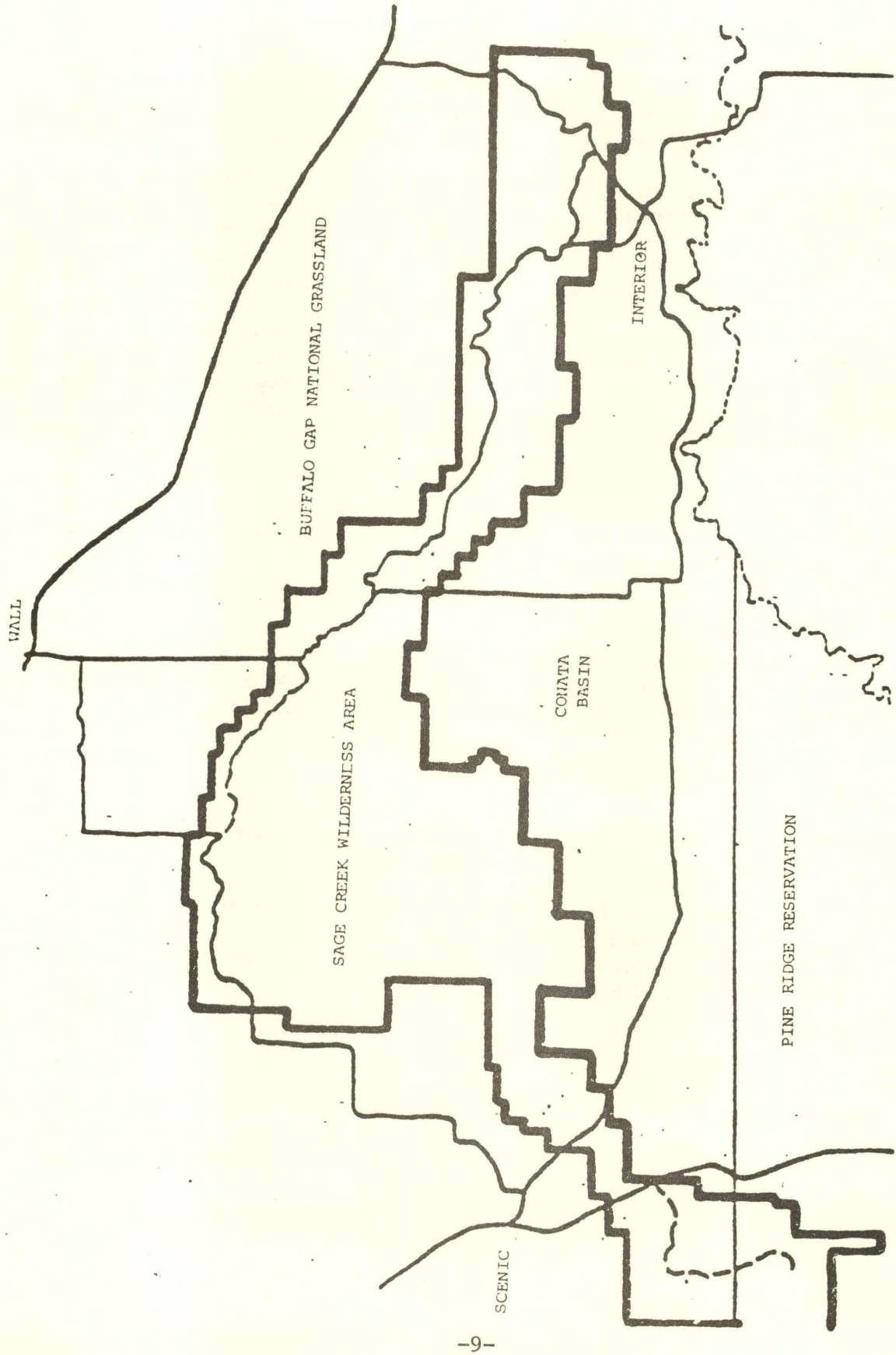


Figure 1. North Unit Badlands National Park

Calimovilfa longifolia/Agropyron smithii

Other habitat types, or potential ones, are less wide-spread and occur on special soils or topographic positions to favor lesser or greater solar radiation and soil moisture than that on normal upland topography.

History of land use in this region is important in understanding, in part, the vegetation composition. Grazing was long a standard practice in the region, and even after the area was designated a National Monument some grazing was allowed inside the monument boundary. Today much of the South Unit is grazed. The result of this grazing activity has been the widespread distribution of alien species. There are very few upland stands of vegetation in which Bromus tectorum and/or Bromus japonicus do not occur. Once established B. tectorum has been found to persist indefinitely in the Western Intermountain region (Daubenmire 1970). The presence B. japonicus in Badlands indicates a possible second species of similar persistence. Another example of unusual density of an alien species is that of Verbascum thapsis on Sheep Mountain where the plant has literally become dominant over much of the area. A burning experiment done in 1988 might provide information regarding this species and its control. Presently, I am investigating the seed germination characteristics of the plant. The top of Sheep Mountain also has some excellent examples of steppe vegetation which appear to be minimally disturbed.

Because of the nature of Phase I of this study, there are no quantitative data to report or analyses to be made. As indicated above, quantitative data will be obtained during Phases II and III.

Conclusions

The results to date are incomplete. So far, there are no reasons to direct the research emphases during Phases II or III.

The study is aimed at defining and delimiting the habitat types in Badlands National Park, South Dakota. The presence of alien species and rare and endangered species is to be noted throughout. Results of earlier experiments on the effects of fire on species composition will be noted. What the effects of fire are on the presence and/or abundance of alien species like Bromus tectorum, B. japonicus and Verbascum thapsis will be noted.

The study should provide direction for long-term monitoring of the vegetation of the habitat types. Indeed, an important aspect of the study should be the value of long-term sampling and monitoring, much of which could be done by Park Service personnel.

References Cited

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