

NPS/BRD VEGETATION MAPPING PROGRAM

Classification of the Vegetation of Scotts Bluff National Monument

The Nature Conservancy
Midwest Regional Office
1313 Fifth St SE, Suite 314
Minneapolis, MN 55414

The Nature Conservancy
International Headquarters
1815 North Lynn Street
Arlington, VA 22209

Table of Contents

Vegetation Sampling and Classification.....	1-1
Introduction.....	1-1
Methods	1-1
Results.....	1-2
Vegetation Classification.....	1-3
Discussion.....	1-6
Contributors.....	1-8
Vegetation Key.....	2-1
Vegetation Description.....	3-1

VEGETATION SAMPLING & CLASSIFICATION

Introduction

This report presents the results of the vegetation classification portion of the NPS/BRD Vegetation Mapping Program at Scotts Bluff National Monument. The methods for sampling the vegetation are briefly discussed, particularly in relation to the standard described in NPS/BRD Vegetation Mapping Program: Field Methods for Vegetation Mapping. Also included in this document are the vegetation classification for Scotts Bluff, the field key to the vegetation types, and descriptions of each vegetation type. The supplements to this report include the field data sheets for the classification plots and the accuracy assessment plots and corresponding electronic data files (in dBase 5.0).

Methods

The methods used for developing the vegetation classification for Scotts Bluff National Monument followed the standards described in Field Methods for Vegetation Mapping (see methods paper for detailed methodology employed). Due to the small size of the Monument, a pilot sampling approach, based on sampling across key environmental gradients and photographic signatures, was not required. The sample area consisted of nearly the entire Monument with only a few sites (cliff faces and river sandbars) being inaccessible to sampling. Polygons were selected for sampling based on:

1) environmental factors (primarily aspect and slope, with soil type used for some vegetation types), 2) geographic location within the Monument (widely dispersed polygons of a given type were preferred), 3) representativeness (polygons were selected to capture the representative variability of each of the vegetation types), and 4) accessibility (in some cases certain polygons were difficult to access).

Sample plots were subjectively located within polygons so as to include representative and non-representative expressions of the community. The heterogeneity of the vegetation and the small number of samples per type precluded randomly selecting plot location. The number of sample plots per vegetation type varied with the total coverage, number of polygons, and variability of each type. Plots sampled per type varied from 0 (cliffs and sandbars) to 12 (prairie) with an average of 5 plots per type.

The size of sample plots also varied with vegetation type. For woodland communities, 15 x 25 m plots were used to sample the canopy and sub-canopy strata, and 10 x 10 m plots were used to sample the shrub and herbaceous strata. An exception was made for the *Juniperus scopulorum* / *Oryzopsis micrantha* Woodland, where restricted stand size required using 10 x 10 m plots to sample all strata. For shrub communities, 10 x 10 m plots were used to sample both the shrub and herbaceous strata. Plot size for the large majority of the herbaceous communities was 10 x 10 m. An exception was made for the seepage community, where the restricted geographic coverage of the community mandated 5 x 5 m and 3 x 3 m plots (these were the largest plots that would fit comfortably within the stands). In sparsely vegetated communities, 10 x 10 m. plots were used to sample all strata for the majority of community types. In the rock outcrop community however, both 10 x 10 m and 5 x 5 m plots were used.

USGS-NPS Vegetation Mapping Program

Scotts Bluff National Monument

In addition to the species information collected within the classification plots, an area around the plot (10 m from the plot boundary, within the same vegetation polygon) was surveyed for the presence of species not found in the plot. These species are found at the end of the species list on the form and are denoted with a "P" rather than a cover class.

The procedures differed from the methods outlined in the "Field Methods" document in two main areas: identification of sample sites and accuracy assessment. High quality aerial photography with delineated vegetation polygons was not available prior to vegetation sampling; thus, some suggested methods for stratifying sampling locations were not applicable. The lack of good aerial photographs was ameliorated somewhat by the terrain of the Monument and the generally low stature of the vegetation. The bluff provided a commanding view of most of the Monument and facilitated the selection of sampling sites. During a two day reconnaissance visit, an initial list of community types was developed by visually inspecting the Monument from the bluff top and then by visiting examples of all of the obvious vegetation polygon types.

Accuracy assessment, as originally envisioned, would have occurred after the completion of the final vegetation map. In order to best utilize field time, however, data (observation points) were collected during this field season and will be used later to assess the accuracy of the map. Accuracy assessment data were collected from 150 sites. On average 10 sites per vegetation type were sampled. However, this varied with the vegetation type. The accuracy assessment sites were spread across the monument and were intended to represent the full variability of each of the vegetation types. In general more sites were chosen for types which had greater geographic extent and variability on the Monument and fewer were chosen for those with lesser geographic extent and variability. The precise site locations were chosen haphazardly. In most cases, to minimize travel time, accuracy assessment points were chosen in the polygons surrounding those for which detailed plot data were collected, at least 50 meters from the plot. Additional accuracy assessment sites were chosen by walking transects across the monument and taking data in the different vegetation types encountered. Data collected for the accuracy assessment sites was similar to that collected on the plots. However, instead of collecting full species lists, only the dominant species in each strata of the vegetation were listed.

Results

Twenty vegetation types were delineated for Scotts Bluff National Monument, including 3 woodland types, 3 shrubland types, 9 herbaceous types and 5 sparsely vegetated types. In addition, two mosaic types were designated that combine a prairie type and sparsely vegetated types. This designation is useful as a mapping label where these the types interdigitate at a finer scale than the mapping unit. The upland herbaceous communities (grasslands) and the sparsely vegetated communities occupy the vast majority of the Monument, with communities dominated by woody or wetland herbaceous vegetation forming minor components.

Staff at the Monument had previously delineated 24 disturbance polygons. These are sites that had been converted to human use (agriculture, golf, etc.) and are currently in various stages of recovery from that disturbance. These polygons have been designated for (or are in the process of) restoration by the Monument staff. At the request of the Monument staff, all of these polygons were sampled to characterize them. These sites were placed in one of two community categories: Mixedgrass Prairie (Restored/Reseeded) or *Kochia scoparia/Bromus* spp. Early Seral Community and described.

In addition, there are other areas of the Monument that have been impacted by past human activity (primarily overgrazing) and have been invaded to various degrees by weedy and exotic species. These areas were never plowed or converted and have maintained a component of their native vegetation. For example, many of the upland grassland sites have been invaded by brome grass (*Bromus* spp.). Many of the most highly disturbed sites are in the river floodplain. Here *Andropogon gerardii* - *Calamagrostis canadensis* - *Helianthus grosseserratus* Herbaceous Vegetation, *Typha latifolia* Inland Great Plains Herbaceous Vegetation, and *Populus deltoides* - (*Salix amygdaloides*) / *Salix exigua* Woodland are heavily dominated by exotics and usually have little resemblance to their natural condition. These sites were assigned community designations that most closely resemble the known natural communities. Due to their degraded condition, the vegetation descriptions of these types for the Monument may not closely resemble their global descriptions.

Following is the vegetation classification for Scotts Bluff National Monument (set within the hierarchy of the National Vegetation Classification System). A vegetation key to facilitate identification of the types in the field and a description of each vegetation type at the Monument are provided in later sections of this report.

Classification

II WOODLAND. Open stands of trees usually over 5 m tall with crowns not usually touching (generally forming 25 to 60% cover)

II.A Evergreen woodland (evergreen species generally contribute >75% of the total tree cover)

II.A.4 Temperate or subpolar needle-leaved evergreen woodland

II.A.4.N.a Rounded-crowned temperate or subpolar needle-leaved evergreen

JUNIPERUS SCOPULORUM WOODLAND ALLIANCE
Juniperus scopulorum / *Oryzopsis micrantha* Woodland

PINUS PONDEROSA WOODLAND ALLIANCE
Pinus ponderosa / *Juniperus scopulorum* Woodland

II.B Deciduous woodland (deciduous species generally contribute >75 % of the total tree cover)

II.B.2 Cold-deciduous woodland

II.B.2.N.b Temporarily flooded cold-deciduous woodland

POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND
ALLIANCE

Populus deltoides - (*Salix amygdaloides*) / *Salix exigua* Woodland

III SHRUBLAND (SCRUB). Shrubs or trees usually 0.5 to 5 m tall with individuals or clump not touching to interlocking (generally forming >25% canopy cover - some examples of defined shrubland communities on Scott's Bluff National Monument may have <25% canopy cover).

III.B Deciduous shrubland (scrub) (deciduous species generally contribute to >75% of the total shrub and/or tree cover)

III.B.2 Cold-deciduous shrubland

III.B.2.N.a Temperate cold-deciduous shrubland

CERCOCARPUS MONTANUS SHRUBLAND ALLIANCE
Cercocarpus montanus / *Bouteloua curtipendula* Shrubland

III.B.2.N.b Temporarily flooded cold-deciduous shrubland

SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND
ALLIANCE
Salix exigua Shrubland

SYMPHORICARPOS OCCIDENTALIS TEMPORARILY FLOODED
SHRUBLAND ALLIANCE
Symphoricarpos occidentalis Shrubland

V HERBACEOUS. Graminoids and/or forbs (including ferns) generally forming >10% cover with woody cover usually <10%

V.A Perennial graminoid vegetation. Graminoids over 1 m tall, generally contributing >50% of total herbaceous cover

V.A.5 Temperate or subpolar grassland

V.A.5.N.a Tall sod temperate grassland (> 60% cover) (including sod or mixed sod-bunch graminoids)

ANDROPOGON GERARDII - (CALAMAGROSTIS CANADENSIS,
PANICUM VIRGATUM) HERBACEOUS ALLIANCE
Andropogon gerardii - *Calamagrostis canadensis* - *Helianthus
grosseserratus* Herbaceous Vegetation

ANDROPOGON HALLII HERBACEOUS ALLIANCE
Andropogon hallii - *Calamovilfa longifolia* Herbaceous Vegetation

V.A.5.N.c Medium tall sod temperate or subpolar grassland (graminoids).
Graminoids usually between 0.5 to 1 m tall, generally contributing
>50% of total herbaceous cover

ALLIANCE UNDEFINED

***Kochia scoparia/Bromus* spp. Early Seral Community**

ALLIANCE UNDEFINED

Mixedgrass Prairie (Reseeded/Restored)

PASCOPYRUM SMITHII HERBACEOUS ALLIANCE

***Pascopyrum smithii* Herbaceous Vegetation**

STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS
ALLIANCE

***Stipa comata - Bouteloua gracilis - Carex filifolia* Herbaceous
Vegetation**

V.A.5.N.l Semipermanently flooded temperate or subpolar grassland

TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.)

SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

***Typha* spp. Inland Great Plains Herbaceous Vegetation**

V.A.5.N.m Saturated temperate or subpolar grassland

CAREX SPP. - TYPHA SPP. SATURATED HERBACEOUS
ALLIANCE

***Typha* spp. - *Equisetum hyemale* - *Carex* spp. Seep Herbaceous
Vegetation**

V.A.6.N.f Medium-tall temperate or subpolar grassland with a sparse needle-
leaved evergreen or mixed tree layer

PINUS PONDEROSA WOODDED MEDIUM-TALL
HERBACEOUS ALLIANCE

***Pinus ponderosa* / *Schizachyrium scoparium* Wooded Herbaceous
Vegetation**

VII SPARSE VEGETATION. Vascular vegetation is scattered or nearly absent (generally <10%). Cover
of non-vascular plants (mosses and lichens) may be absent to continuous.

VII.A Consolidated rocks sparse vegetation (cliff and pavement)

VII.A.1 Sparsely vegetated cliff

VII.A.1.N.a Cliffs with sparse vascular vegetation

OPEN BLUFF / CLIFF SPARSE VEGETATION
Inland Siltstone Bluff - Cliff

ROCK OUTCROP / BUTTE SPARSE VEGETATION
Siltstone - Clay Butte Sparse Vegetation

VII.C Unconsolidated material sparse vegetation

VII.C.2 Sparsely vegetated sand flats

VII.C.2.N.c Temporarily flooded sand flats
SAND FLATS TEMPORARILY FLOODED SPARSE VEGETATION
Riverine Sand Flats - Bars Sparse Vegetation

VII.C.3 Sparsely vegetated soil slopes

VII.C.3.N.b Dry slopes

LARGE ERODING CLIFFS SPARSE VEGETATION
Eroding Great Plains Badlands Sparse Vegetation

SMALL ERODING CLIFFS / BANKS SPARSE VEGETATION
Eroding Great Plains Slopes Sparse Vegetation

Discussion

Overall, the sampling of vegetation and development of a classification for Scotts Bluff were successful. There were a number of minor difficulties (to be expected in a pilot project), and the lessons learned should prove valuable for future mapping projects. The primary drawback for this project was the lack of good aerial photography with delineated polygons prior to vegetation sampling. We were able to work around this limitation due to the small size of the Monument, the availability of a vantage point from which to view the area (the bluff itself), and the low stature of the vegetation. In most other National Park Service units, however, this lack of aerial photos would have jeopardized the ability to conduct sampling and develop a classification. Proceeding without photos may provide a useful test of how well prior knowledge of vegetation types facilitates the development of the final vegetation map. Following are some specific recommendations that should improve future vegetation mapping projects:

- 1) Aerial photography should be flown the year before vegetation sampling and generally at the same time of year as the sampling will occur. Optimally, these photos should be available to personnel planning the field work during the winter before the field work.

USGS-NPS Vegetation Mapping Program

Scotts Bluff National Monument

- 2) Vegetation sampling should be conducted by two person teams, an ecologist/botanist and an assistant. Having a second person to help haul equipment, lay out plots, record data, and take GPS readings may more than double the efficiency of the operation.
- 3) For grasslands it may be best to sample using transects rather than releve plots. Grasslands in the Great Plains can have great variability in species composition and abundance within limited areas due to past disturbances animal use (e.g. gophers), soils, etc. It may be worthwhile to test whether transects would better capture this variability and provide better descriptions of community types.
- 4) Analysis of the time requirements for this project should be incorporated into future projects to develop more realistic deadlines for the vegetation sampling and development of various products.

Contributors

The following individuals contributed to this report:

Steve Rolfsmeier
Route 2, Box 134A
Milford, NE 68405

Gerry Steinauer
Nebraska Natural Heritage Program
2200 North 33rd Street
Lincoln, NE 68503

Rick Schneider
Jim Drake
Janette Aldrich
Don Faber-Langendoen
The Nature Conservancy
Midwest Regional Office
1313 Fifth Street, SE
Minneapolis, MN 55414

Kathy Goodin
Cynthia Swinehart
Dennis Grossman
The Nature Conservancy
International Headquarters
1815 North Lynn Street
Arlington, VA 22209