

VEGETATION SAMPLING AND CLASSIFICATION

Introduction

This report presents the results of the vegetation classification portion of the NPS/USGS BRD Vegetation Mapping Program at Fort Laramie National Historic Site. Sampling strategy and field methods are described for both plot and accuracy assessment sampling. The vegetation classification, field key to the vegetation types, and descriptions of each type are also included. As a supplement to this report, the raw plot data and accuracy assessment points are included as original field forms and in electronic form in the PLOTS database (a Microsoft Access database).

Methods

In general, the field methods used for developing the classification followed the standards outlined in the Field Methods for Vegetation Mapping document produced for this project. This began with the development of a preliminary vegetation classification based on literature review and an initial visit to the site. The preliminary classification was used to identify polygons delineated from aerial photos. Due to the small size of the mapping area it was not deemed necessary to limit sampling to subsets of the whole area or to stratify it based on environmental or other factors. Although environmental information was not used to stratify the mapping area, data were collected from across a range of conditions on the mapping area to capture as much of the variation in the vegetation as possible. The field team performed a reconnaissance of the mapping area, collecting limited environmental and vegetation information from points (called observation points) across the area. These points were used to refine the classification before detailed plot sampling began. Plot data and observation points were collected from across the entire mapping area, not just within the boundaries of Fort Laramie NHS. Getting access to lands within the mapping area but beyond the boundaries of Fort Laramie NHS was not difficult because all such land was public land.

Within polygons, plots were subjectively placed in vegetation that was judged to be representative of the whole polygon. In some polygons this was difficult because dominant species were distributed in patches. In these cases, the patchiness was noted on the field forms. Total number of plots and observation points per vegetation type was related to areal coverage of each vegetation type, widespread types had more plots than those with limited distribution. The combined number of plots (49) and observation points (53) varied from 0-21 per type, with an average of 6.4 per type. Plot size also varied with vegetation type. Woodland communities were sampled with 20 x 20 m plots. Shrub and herbaceous dominated communities were sampled with 10 x 10 m plots, and sparsely vegetated communities were sampled with 5 x 5 m plots.

Both plots and observation points were used to produce the final classification of Fort Laramie NHS. Field personnel organized the plots and observation points into groups based on vegetation structure and composition. Average cover of each species and vegetation stratum were computed. The plots were analyzed using an ordination technique, Detrended Correspondence Analysis (DCA), and a clustering algorithm, Unweighted Pair-Group Method Using Arithmetic Means (UPGMA). Because there were few plots per type and the locations of the plots were chosen to represent the variation of a type at Fort Laramie NHS, there was substantial variation within each type. In addition, the extensive history of disturbance has allowed invasive species to become established with the natural vegetation. These factors lessened the utility of the numerical analyses. Thus, the results of the numerical analyses were not used to derive the classification, but were compared to the subjective classification and any discrepancies in plot placement were examined.

Accuracy assessment data were collected following the procedures outlined in the Field Methods for Vegetation Mapping document produced for this project. The amount of data collected for each polygon was the same as that collected for observation points. 180 accuracy assessment points were collected from Sept. 2-Sept. 10, 1997. Points were placed as near to the center of delineated polygons as possible. Polygons in which accuracy assessment was done were spread across the mapping area and chosen by the field team to reflect the relative abundance of vegetation types.

Results

The classification of the vegetation at Fort Laramie NHS resulted in 16 types being defined, including one woodland type, one shrubland type, 11 herbaceous types, and three sparsely vegetated types. Three of the herbaceous types are not placed within the National Vegetation Classification System (NVCS). Areas placed within these types are dominated by exotic and/or invasive species. They are so disturbed that they cannot be accurately placed within the natural vegetation subgroup of the NVCS. The names of these three types end with "Community" to signify that they have not been placed in the NVCS.

Many parts of the mapping area that are classified as natural vegetation have been disturbed in the past. This made classification of these areas problematic. Species lists and structure of these areas are different from less disturbed examples of the same community. The most difficult type to place within the NVCS was *Bouteloua gracilis* - *Carex filifolia* Herbaceous Vegetation. The examples on Fort Laramie NHS do not closely match the description for this type in other parts of Wyoming, but this appeared to be the closest match for the sites at Fort Laramie NHS. Further comparison of these sites and others like them may result in re-classification.

The classification of Fort Laramie NHS, placed within the NVCS, follows. A field key and descriptions for each of the types are included in later sections of this report.

Classification

II. WOODLAND

II.B. Deciduous woodland

II.B.2. Cold-deciduous woodland

II.B.2.N Natural/semi-natural

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

***POPULUS DELTOIDES* TEMPORARILY FLOODED WOODLAND ALLIANCE**

Populus deltoides / *Symphoricarpos occidentalis* Woodland

III SHRUBLAND

III.B Deciduous shrubland

III.B.2.N Natural/semi-natural

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

***SALIX EXIGUA* TEMPORARILY FLOODED SHRUBLAND ALLIANCE**

Salix exigua Shrubland [Provisional]

V. HERBACEOUS

V.A. Perennial graminoid vegetation

V.A.5. Temperate or subpolar grassland

V.A.5.N Natural/semi-natural

V.A.5.N.c. Medium-tall sod temperate or subpolar grassland

PASCOPTRUM SMITHII HERBACEOUS ALLIANCE

Pascoptrum smithii Herbaceous Vegetation

STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

Stipa comata - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation

V.A.5.N.d. Medium-tall bunch temperate or subpolar grasslands

STIPA COMATA BUNCH HERBACEOUS ALLIANCE

Stipa comata - Yucca glauca Herbaceous Vegetation

V.A.5.N.e. Short sod temperate or subpolar grassland

BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

Bouteloua gracilis - Carex filifolia Herbaceous Vegetation

V.A.5.N.j. Temporarily flooded temperate or subpolar grassland

SPARTINA PECTINATA TEMPORARILY FLOODED HERBACEOUS ALLIANCE

Spartina pectinata - Scirpus pungens Herbaceous Vegetation

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland

CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

Carex nebrascensis Herbaceous Vegetation

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

TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SSP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

Typha latifolia Western Herbaceous Alliance

V.A.5.C Cultural

Formation undefined

ALLIANCE UNDEFINED

Bromus inermis Disturbed Community

ALLIANCE UNDEFINED

Sporobolus cryptandrus Disturbed Community

ALLIANCE UNDEFINED

Upland Weedy Community

- V.A.6. Temperate or subpolar grassland with a sparse tree layer
 - V.A.6.N Natural/semi-natural
 - V.A.6.N.f. Medium-tall temperate or subpolar grassland with a sparse needle-leaved evergreen or mixed tree layer
 - PINUS PONDEROSA WOODED MEDIUM-TALL HERBACEOUS ALLIANCE**
 - Pinus ponderosa* / *Schizachyrium scoparium* Wooded Herbaceous Vegetation

VII SPARSE VEGETATION

- VII.A Consolidated rock sparse vegetation
 - VII.A.1. Sparsely vegetated cliffs
 - VII.A.1.N Natural/semi-natural
 - VII.A.1.N.a. Cliffs with sparse vascular vegetation
 - ROCK OUTCROP / BUTTE SPARSE VEGETATION**
 - Sandstone Rock Outcrop Sparse Vegetation
- VII.C Unconsolidated material sparse vegetation
 - VII.C.2 Sparsely vegetated sand flats
 - VII.C.2.N Natural/semi-natural
 - VII.C.2.N.a. Sand flats
 - ALLIANCE UNDEFINED**
 - Upland Sand and Gravel Sparse Vegetation
 - VII.C.2.N.c. Temporarily flooded sand flats
 - SAND FLATS TEMPORARILY FLOODED SPARSE VEGETATION**
 - Riverine Sand Flats - Bars Sparse Vegetation

Conclusion

The vegetation of Fort Laramie NHS was classified using the techniques established for the NPS/BRD Vegetation Mapping Program. Most of the vegetation types were placed in the NVCS. Due to disturbance in some areas, some of the vegetation at Fort Laramie NHS did not closely match the more general, national description of the community into which it was placed. In addition, a few types did not fit within the current NVCS and retained park-specific names and descriptions. It is expected that these will be placed within a national hierarchy as the NVCS is further developed.

The general methods outlined for the NPS/BRD Vegetation Mapping Program worked well in this project. There were several factors which contributed to this. The first was that the field team had aerial photographs with preliminary polygons already delineated when they began field work. This made choosing plot and observation point locations much more efficient than would otherwise have been the case, especially given the limited environmental data available. The second was that the field personnel had been involved in mapping other parks for this project. This eliminated the need for training and made for more efficient use of field time. Finally, the small size and relatively gentle terrain of the mapping area made many aspects of the field effort easier.

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