

USGS-NPS VEGETATION MAPPING PROGRAM

Classification of the Vegetation of Mount Rushmore National Memorial

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VEGETATION SAMPLING AND CLASSIFICATION

Introduction

This report presents the results of the vegetation classification portion of the USGS-NPS Vegetation Mapping Program at Mount Rushmore National Memorial. The major goal of this portion of the project was to classify and describe all plant communities found within the study area. In addition, vegetation data were used by the photointerpreter to determine relationships between signatures on aerial photos and vegetation types on the ground, and in some cases, to correlate habitat characteristics and vegetation types for predictive modeling. Sampling strategy and field methods are described for vegetation 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 are included as original field forms and in electronic form in the PLOTS database (a Microsoft Access database).

Methods

The methods used for the sampling and analysis of vegetation data and the development of the classification generally followed the standards outlined in the Field Methods for Vegetation Mapping document produced for this project. This process began with the development of a preliminary list of vegetation types from the National Vegetation Classification System (NVCS) that were thought to have a high likelihood of being in the mapping area. The list was prepared by literature review, including previous vegetation classifications of the Memorial, and contacting knowledgeable experts. Due to the small size of the mapping area, sampling occurred across the entire mapping area. Most samples were taken from within the boundaries of the Memorial.

Nineteen plots were collected in late July and August of 1996. The field team attempted to place plots in each of the vegetation types on the preliminary list that they could find. In addition, vegetation types that were encountered in the field which appeared distinct from any on the preliminary list were sampled. Plots were subjectively placed, generally in vegetation that was representative of an area of relatively homogeneous vegetation which covered more than 1/2 ha (the minimum mapping unit). Thus, ecotones and small patches were avoided. However, in cases where several vegetation types regularly occurred in mosaics of small stands, it was necessary to use multiple plots and sample smaller patches.

Number of plots and plot size varied by community. The number of plots depended on the areal extent of the community on Mount Rushmore NM, i.e. more widespread communities had more plots than rarer ones. Forest and woodland communities were sampled with 20 x 20 meter plots while herbaceous communities were sampled with 10 x 10 meter plots. In some instances

rectangular plots of the same area were used (i.e. 10 x 40 m or 5 x 20 m) in linear or narrow polygons.

In late May and June of 1997, after a preliminary vegetation map had been prepared by the photointerpreter, a map validation step was performed in which further data were collected to obtain more information on the vegetation types and to better correlate the vegetation with the signatures on the aerial photographs. Sampling was conducted at points selected by the photointerpreter based on a stratified random design in which more extensive vegetation types were allocated more points. This resulted in the collection of 46 observation points. At each point, the dominant species in each vegetation stratum were recorded with an estimated cover class. These extra points gave a better understanding of the variation within vegetation types and allowed sampling of two types that had not been found in the previous field season.

The final vegetation classification and descriptions were produced using plots, observation points, and the experience of the field team. Field personnel organized the plots and observation points into groups based on vegetation structure and composition. The number of plots ranged from 0-5 per type and the number of observation points ranged from 0-11 per type. Black Hills Rock Outcrop Sparse Vegetation was not sampled with either plots or observation points because it was easily distinguished from surrounding vegetation types. Quantitative analyses were performed to compare to the subjective classification. Average cover of each species and vegetation stratum were computed. Only the plots were used for quantitative analysis because of the more detailed information collected for them. They 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 emphasize the variation within a vegetation type, there was substantial variation within each type. 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.

Results

The classification of the vegetation of Mount Rushmore NM resulted in nine types being defined, including two forest types, four woodland types, two herbaceous types, and one sparsely vegetated type.

The vegetation types described in this report do not necessarily correspond to units on the final vegetation map, for several reasons. In some cases, two or more plant communities distinguishable on the ground could not be distinguished in aerial photographs, nor predicted based on habitat characteristics. In this type of situation, the photointerpreter lumped multiple plant communities into a single map unit, labeled as a complex. In other cases, multiple communities occur as mosaics of small distinct stands which vary over too fine a scale to be mapped individually. These are mapped as mosaics.

In classifying vegetation, we attempt to recognize distinctive assemblages of plant species that occur repeatedly in appropriate habitat conditions. These plant communities become the basic

mapping units in preparing vegetation maps. In some cases, the concept of a discrete assemblage of plants characteristic of a given habitat works very well. For example, in the Black Hills it is easy to correctly predict associated species and habitat characteristics for stands of paper birch and beaked hazel. In other cases, it can be very difficult to subdivide vegetation into consistent, repeating assemblages of species. Much of the ponderosa pine vegetation in the Black Hills presents this problem to some degree. Understory composition often is too variable or varies over too fine a scale to easily define discrete communities, especially using remotely sensed data. Boundaries are not easily recognized. Types grade into other types. The extensive disturbance history of ponderosa pine stands in the Black Hills makes this picture even more difficult to interpret.

In the Black Hills, many investigators have reported difficulties in classifying ponderosa pine vegetation. In our study, we encountered the same problems. Pine stands at environmental extremes (most xeric, most mesic) tended to be fairly consistent in species composition. *Pinus ponderosa* / *Schizachyrium scoparium* Wooded Herbaceous Vegetation (dry slopes, often south-facing) and *Pinus ponderosa* / *Physocarpus monogynus* Forest (northerly slopes) are two good examples. In contrast, stands found on intermediate sites were often problematic due to variable understory composition.

The classification of Mount Rushmore NM follows. A field key and descriptions for each of the types are included in later sections of this report.

1. Forest
 - I.B. Deciduous forest
 - I.B.2 Cold-deciduous forest
 - I.B.2.N Natural/semi-natural
 - I.B.2.N.a. Lowland or submontane cold-deciduous forest
QUERCUS MACROCARPA FOREST ALLIANCE
Quercus macrocarpa / *Ostrya virginiana* Forest
 - I.B.2.N.b Montane or boreal cold deciduous forest
BETULA PAPYRIFERA FOREST ALLIANCE
Betula papyrifera / *Corylus cornuta* Forest
- II. Woodland
 - II.A. Evergreen forest
 - II.A.4. Temperate or subpolar needle-leaved evergreen woodland
 - II.A.4.N Natural/semi-natural
 - II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland
PINUS PONDEROSA WOODLAND ALLIANCE
Pinus ponderosa / *Arctostaphylos uva-ursi* Woodland
Pinus ponderosa / *Juniperus communis* Woodland
Pinus ponderosa / *Oryzopsis asperifolia* Woodland
Pinus ponderosa / *Quercus macrocarpa* Woodland
- V. Herbaceous Vegetation
 - V.A. Perennial graminoid vegetation
 - V.A.5. Temperate or subpolar grassland

- V.A.5.N Natural/semi-natural
 - V.A.5.N.j. Temporarily flooded temperate or subpolar grassland
 - CAREX LANUGINOSA TEMPORARILY FLOODED HERBACEOUS ALLIANCE**
 - Carex lanuginosa* - *Calamagrostis stricta* Herbaceous Vegetation
- 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 needled-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**
 - Black Hills Rock Outcrop Sparse Vegetation

Conclusion

The vegetation of Mount Rushmore NM was classified using the techniques established for the NPS/BRD Vegetation Mapping Program. All of the vegetation types fit within existing associations in the NVCS. Due to extensive disturbance and regional variation, some of the vegetation at Mount Rushmore NM did not closely match the more general, national description of the community into which it was placed.

Several recommendations for future mapping projects have flowed from the experience gained mapping Mount Rushmore NM. It is recommended that future mapping projects begin fieldwork with a reconnaissance step involving observation point data collection from a large number of points. This type of sampling goes relatively fast and would allow the project investigators to identify plant communities within the study area and to get some feel for variation within each type. After a preliminary classification is in hand, representative stands could be selected for more detailed vegetation plots. Data collected for observation points would also supplement vegetation plot data in preparing community descriptions. This approach is most suited to small parks where regaining access to an area is not especially time-consuming or difficult. In larger parks or those with remote areas, it would still be beneficial to collect observation points from the same area and at the same time as plots are being collected.

Communication between the field ecologists and the photointerpreters/mappers is vital for a successful project. One step that can help this is to begin field work with aerial photos with

preliminary vegetation polygons delineated. This helps the ecologists direct their sampling and the process of polygon delineation often generates questions relating to vegetation classification which the field team can investigate during vegetation sampling instead of after the field season.

Contributors

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2. FIELD KEY TO THE PLANT COMMUNITIES OF MOUNT RUSHMORE NATIONAL MEMORIAL

1. > 10% vegetated
 2. trees present, cover > 10%
 3. broadleaf tree cover > 10%
 4. *Betula papyrifera* cover > 20%
***Betula papyrifera* / *Corylus cornuta* Forest**
 4. *Quercus macrocarpa* cover > 10%
 5. *Ostrya virginiana* present
***Quercus macrocarpa* / *Ostrya virginiana* Forest**
 5. *Ostrya virginiana* absent; oak dominates subcanopy with a few pines in canopy (vs. scattered oaks in pine stand)
***Pinus ponderosa* / *Quercus macrocarpa* Woodland**
 3. broadleaf trees absent or < 10% cover in canopy/subcanopy
 6. *Arctostaphylos uva-ursi* cover > 10%
***Pinus ponderosa* / *Arctostaphylos uva-ursi* Woodland**
 6. not as above
 7. *Schizachyrium scoparium* cover > 10%
***Pinus ponderosa* / *Schizachyrium scoparium* Wooded Herbaceous Vegetation**
 7. not as above
 8. shrub/herbaceous cover usually < 50%; *Juniperus communis* present
***Pinus ponderosa* / *Juniperus communis* Woodland**
 8. *Oryzopsis asperifolia* present; herbaceous stratum variable in composition
***Pinus ponderosa* / *Oryzopsis asperifolia* Woodland**
 2. trees absent, or cover < 10%, wetland

***Carex lanuginosa* - *Calamagrostis stricta* Herbaceous Vegetation**

1. < 10% vegetated

Black Hills Rock Outcrop Sparse Vegetation

3. VEGETATION DESCRIPTIONS FOR MOUNT RUSHMORE NATIONAL MEMORIAL

Quercus macrocarpa / Ostrya virginiana Forest

COMMON NAME	Bur Oak / Eastern Hop-Hornbeam Forest
SYNONYM	Bur Oak - Ironwood Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (I.B.2.N)
FORMATION	Lowland or submontane cold-deciduous forest (I.B.2.N.a.)
ALLIANCE	<i>Quercus macrocarpa</i> Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in the Black Hills of South Dakota, at elevations of 1067-1400 m (3500-4600 ft).

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A single stand of this community was found in a tributary drainage in the southeast corner of the study area.

ENVIRONMENTAL DESCRIPTION

Globally

This community has been reported on gentle to moderately steep (14-47%) northerly slopes (Hoffman and Alexander 1987, Johnston 1987). Most occurrences are on upland slopes but some are along streams and gullies. The soils are sandy loams and loams with pH of 5.8-7.4 (Johnston 1987).

Mount Rushmore National Memorial

This community was found only in a drainage bottom of a tributary to Iron Creek in the southeast corner of the study area.

MOST ABUNDANT SPECIES

Globally

Stratum

Tree canopy

Subcanopy

Short shrub

Herbaceous

Species

Quercus macrocarpa, *Fraxinus pennsylvanica*

Ostrya virginiana

Prunus virginiana, *Ribes* spp., *Symphoricarpos occidentalis*

Carex foenea, *Carex sprengelii*, *Elymus virginicus*

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Stratum

Tree canopy
Subcanopy
Short shrub
Herbaceous

Species

Ostrya virginiana, *Betula papyrifera*, *Quercus macrocarpa*
Prunus virginiana, *Amelanchier alnifolia*
Physocarpus monogynus, *Toxicodendron rydbergii*
Aralia nudicaulis, *Maianthemum stellatum*

DIAGNOSTIC SPECIES

Globally

Fraxinus pennsylvanica, *Prunus virginiana*, *Amelanchier alnifolia*, *Symphoricarpos* spp., *Maianthemum stellatum*, *Quercus macrocarpa*, *Ostrya virginiana*

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Ostrya virginiana, *Quercus macrocarpa*

VEGETATION DESCRIPTION

Globally

This community is dominated by closely spaced small trees of *Quercus macrocarpa*, with physiognomic similarity to those of *Q. gambelii* of the central Rocky Mountains. In some areas across the range of this type *Fraxinus pennsylvanica* may be present. *Ostrya virginiana* is present in the tree subcanopy, and *Carex foenea* is found in the herbaceous layer. Other species which may be found in this type include *Carex saximontana*, *Carex sprengelii*, *Elymus virginicus*, *Mahonia repens*, *Maianthemum stellatum*, *Phlox gracilis* ssp. *gracilis*, *Prunus virginiana* var. *virginiana*, *Ribes* spp., *Symphoricarpos occidentalis*, *Thalictrum* spp., and *Woodsia* spp. In four stands sampled by Hoffman and Alexander (1987), the shrubs covered an average of 16%, graminoids 17%, and forbs 17%. The basal area in these stands was 26.6 m²/ha.

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A single stand of this vegetation type was found. The canopy was dominated by hardwoods, with several tall pines forming an emergent stratum. Canopy cover was estimated at 25 to 60%, with *Ostrya virginiana* the most abundant species. *Betula papyrifera* and *Quercus macrocarpa* were significant components. Subcanopy coverage was estimated at 10 to 25%; canopy species were present as well as *Prunus virginiana* and *Amelanchier alnifolia*. Short shrub cover was estimated at 25 to 60%, with *Physocarpus monogynus* the most abundant species. Herbaceous cover was in the 10 to 25% range. *Aralia nudicaulis* and *Maianthemum stellatum* were the most abundant components.

OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G2

RANK JUSTIFICATION Many

Quercus macrocarpa-dominated stands in the Black Hills are heavily grazed (Hoffman and Alexander 1987).

DATABASE CODE CEG L000555

COMMENTS

Globally

The suppression of fire may negatively impact this community, since disturbances such as fire may be required for the successful regeneration of oaks (Sieg 1991). One method to improve the condition of native woodlands is with proper range management techniques.

The riparian sites of this type may have experienced periodic flooding. The upland portions of this type may have been subject o periodic fire (which led to oak regeneration).

This community has been described only from the Black Hills. The stands used to document this type, as described by Hoffman and Alexander (1987) had high basal area and densities, possibly due to their sampling procedure.

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Hoffman, G. R. and R. R. Alexander. 1987. Forest vegetation of the Black Hills National Forest of South Dakota and Wyoming: A habitat type classification. Research Paper RM-276. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 48 p.

Johnston, B. C. 1987. Plant associations of region two. Report R2-ECOL-87-2. P. 153, USDA, Forest Service, Rocky Mountain Region, Lakewood, CO. 429 p.

Sieg, C. H. 1991. Ecology of bur oak woodlands in the foothills of the Black Hills, South Dakota. Ph.D. dissertation. Department of Range and Wildlife Management, Texas Tech University. Lubbock, Texas.

Betula papyrifera / Corylus cornuta Forest

COMMON NAME	Paper Birch / Beaked Hazel Forest
SYNONYM	Paper Birch / Hazel Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b.)
ALLIANCE	<i>Betula papyrifera</i> Forest Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community occurs in North Dakota, South Dakota, and Wyoming.

Mount Rushmore National Memorial

This community occurs throughout the study area. It is best developed in major drainages, such as Grizzly Bear Creek, Starling Basin, Lafferty Gulch, and other tributaries south of Battle Creek.

ENVIRONMENTAL DESCRIPTION

Globally

This community has been sampled in the Kildeer Mountains of North Dakota and the Bear Lodge Mountains of Wyoming. It was found on nearly level ground with silt loam soil in North Dakota (Girard et al. 1989, McAdams et al. 1998) and on steep north facing slopes in Wyoming (Jones 1992).

Mount Rushmore National Memorial

This community occurs in drainage bottoms and adjacent lower slopes. It was observed on slopes ranging from 0 to 20 degrees and the aspect generally was northerly.

MOST ABUNDANT SPECIES

Globally

USGS-NPS Vegetation Mapping Program
Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Betula papyrifera</i>
Shrub	<i>Corylus cornuta</i> , <i>Prunus virginiana</i>
Herbaceous	<i>Actaea rubra</i> , <i>Aralia nudicaulis</i> , <i>Carex</i> spp., <i>Maianthemum canadense</i>

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<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Betula papyrifera</i>
Subcanopy	<i>Betula papyrifera</i> , <i>Populus tremuloides</i> , <i>Quercus macrocarpa</i>
Tall shrub	<i>Corylus cornuta</i>
Herbaceous	<i>Aralia nudicaulis</i> , <i>Maianthemum canadense</i> , <i>Viola canadensis</i> (see Vegetation Description below)

DIAGNOSTIC SPECIES

Globally

Betula papyrifera, *Corylus cornuta*

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Betula papyrifera, *Corylus cornuta*

VEGETATION DESCRIPTION

Globally

This community has a predominantly closed canopy dominated by *Betula papyrifera*. Other trees that may contribute significantly to the canopy are *Quercus macrocarpa*, *Populus tremuloides*, and, in the Bear Lodge Mountains, *Pinus ponderosa*. *Fraxinus pennsylvanica* may be present, especially as small trees or saplings. There is a tall shrub layer that usually reaches 2 m or more. The most abundant shrub is *Corylus cornuta*. Other species found in this layer are *Amelanchier alnifolia* and *Prunus virginiana*. Jones (1992) reported a low shrub layer that consisted of *Symphoricarpos* spp., *Spiraea betulifolia*, *Shepherdia argentea*, and *Ribes* spp. Common herbaceous species include *Actaea rubra*, *Maianthemum canadense*, *Carex* spp., *Aralia nudicaulis*, *Apocynum androsaemifolium*, and *Schizachne purpurescens*.

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This community is dominated by *Betula papyrifera* in the canopy and subcanopy. *Populus tremuloides* and *Quercus macrocarpa* are often present but not dominant. A few tall pines may form an emergent stratum. Canopy coverage is at least 10% and often in the 60 to 100 % range. Subcanopy coverage is more variable, but can be high as well. Tall shrub cover typically is in the 25 to 60% range, but can be greater. *Corylus cornuta* strongly dominates this stratum. Herbaceous cover usually is greater than 60% and very species-rich. No species occurs in abundance; several of the more consistently occurring species are listed above.

OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G2?

RANK JUSTIFICATION

Currently there are seven occurrences documented from North Dakota; the community is also reported from Wyoming and South Dakota. The state rank in Wyoming is S1S2. Estimated total number of occurrences is fewer than 25 but may be larger. The total currently documented acreage is less than 120 ha. Most occurrences are smaller than 20 ha, so the total acreage is probably less than 250 ha. The range may be fairly restricted. Most of the documented occurrences are also in good condition.

DATABASE CODE CEG002079

COMMENTS

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Pinus ponderosa / Arctostaphylos uva-ursi Woodland

COMMON NAME	Ponderosa Pine / Bearberry Woodland
SYNONYM	Ponderosa Pine / Kinikinnick Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a.)
ALLIANCE	<i>Pinus ponderosa</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	1
USFWS WETLAND SYSTEM	Upland

RANGE *Globally*

This community is found in southeastern Montana, eastern Wyoming, and western South Dakota.

Mount Rushmore National Memorial

This community is widely distributed. It is best developed in areas underlain by granite.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found on flat to gently sloping terrain (3-21%) in the Black Hills and surrounding areas (Hoffman and Alexander 1987). It has been found from 1540-3000 m (4250-9100 ft). The slopes are more likely to be facing northward than southward. Soils are sandy loams and clay loams.

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This community was found on gentle to moderate slopes (usually less than 20 degrees) of all aspects. Rock outcrops are common. This type is best developed in areas underlain by granite, with the *Arctostaphylos uva-ursi* often forming large mats among outcrops. It is less common in areas underlain by schist.

MOST ABUNDANT SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
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Tree canopy	<i>Pinus ponderosa</i>
Short shrub	<i>Arctostaphylos uva-ursi</i> , <i>Juniperus communis</i> , <i>Symphoricarpos albus</i>
Herbaceous	<i>Oryzopsis asperifolia</i>

Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i>
Short shrub	<i>Arctostaphylos uva-ursi</i>

DIAGNOSTIC SPECIES

Globally

Pinus ponderosa, *Arctostaphylos uva-ursi*, *Shepherdia canadensis*

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Pinus ponderosa, *Arctostaphylos uva-ursi*

VEGETATION DESCRIPTION

Globally

Pinus ponderosa is the dominant tree in this woodland community. *P. ponderosa* reproduces successfully in this community and is found as seedlings and saplings as well as mature trees. There may be seedlings of *Populus tremuloides* and *Quercus macrocarpa*. In northern New Mexico and southern Colorado, *Pseudotsuga menziesii* may also be present, but elsewhere rarely do any species except *Pinus ponderosa* grow larger than saplings. Shrubs are prominent in this community. Hoffman and Alexander (1987) found that in 10 stands in the Black Hills, shrubs averaged 43.9% cover while the herbaceous stratum averaged 19.3% cover. The most abundant shrub was *Arctostaphylos uva-ursi*, which covered an average of 33% (range of 10-85%) of the surface. Other shrubs that are likely to be present are *Spiraea betulifolia*, *Juniperus communis*, and *Symphoricarpos albus*. Typical herbaceous species are *Achillea millefolium*, *Fragaria virginiana*, *Lathyrus ochroleucus*, and *Oryzopsis asperifolia*.

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This community is dominated by *Pinus ponderosa* in the canopy. Coverage generally is less than 25%. Subcanopy typically is sparse or absent, but can have coverage as high as 60%, with *P. ponderosa* and *Populus tremuloides* occurring most commonly. *Arctostaphylos uva-ursi* dominates the short shrub stratum, with coverage usually greater than 10% and often significantly higher (25 to 60%).

OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G4

RANK JUSTIFICATION

DATABASE CODE CEG000844

COMMENTS

Globally

Fire was likely an important factor in the regulation of stand structure historically.

The stands used to document the *Pinus ponderosa* / *Arctostaphylos uva-ursi* Habitat Type described by Hoffman and Alexander (1987) had very high basal area and densities for a woodland, possibly due to their sampling procedure. The dense structure may have affected the floristic makeup of the stands and made the list of dominant species a poor reflection of the community as a whole.

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Pinus ponderosa / Juniperus communis Woodland

COMMON NAME	Ponderosa Pine / Common Juniper Woodland
SYNONYM	Ponderosa Pine / Common Juniper Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a.)
ALLIANCE	<i>Pinus ponderosa</i> Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is found in eastern Montana, the Bighorn Mountains in northern Wyoming, and the Black Hills of western South Dakota and eastern Wyoming.

Mount Rushmore National Memorial

This community is widespread and was found throughout the study area.

ENVIRONMENTAL DESCRIPTION

Globally

This community is most often found on moderate north and west facing slopes (Hansen and Hoffman 1987, Hoffman and Alexander 1987, Hoffman and Alexander 1976). The soils are shallow and loamy.

Mount Rushmore National Memorial

This community occurs on moderate to steep slopes (typically between 15 and 30 degrees), and on all aspects but southerly. Sites are underlain with granite and/or schist and rock outcrops are common.

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Mount Rushmore National Memorial

MOST ABUNDANT SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i>
Short shrub	<i>Mahonia repens</i> , <i>Juniperus communis</i>
Herbaceous	<i>Carex inops</i> ssp. <i>heliophila</i> , <i>Lathyrus ochroleucus</i> , <i>Schizachyrium scoparium</i>

Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i>
Subcanopy	<i>Pinus ponderosa</i>
Short shrub	<i>Juniperus communis</i>

DIAGNOSTIC SPECIES

Globally

Pinus ponderosa, *Juniperus communis*, *Mahonia repens*, *Achillea millefolium*.

Mount Rushmore National Memorial

Pinus ponderosa, *Juniperus communis*

VEGETATION DESCRIPTION

Globally

This community is dominated by *Pinus ponderosa* in the overstory. Other tree species that may be present are *Picea glauca* and *Populus tremuloides*. The canopy is usually moderately closed but can become nearly closed in stands that are not disturbed for long periods. There is a prominent low shrub layer whose most abundant component is *Juniperus communis*. This species covered an average of 25% (range of 4-42%) in 7 stands in the Black Hills of South Dakota and Wyoming (Hoffman and Alexander 1987). Total average cover by the shrub layer was 51% and by the herb layer was 8%. Other shrub species found in this community across its range are *Arctostaphylos uva-ursi*, *Mahonia repens*, *Spiraea betulifolia*, and *Symphoricarpos albus*. Typical herbaceous species are *Achillea millefolium*, *Carex inops* ssp. *heliophila*, *Schizachyrium scoparium*, *Fragaria* spp., and *Lathyrus ochroleucus* (McAdams et al. 1998).

Mount Rushmore National Memorial

This vegetation type is dominated by *Pinus ponderosa* in both the canopy and subcanopy. Coverage and structure vary. Canopy cover often is in the 10 to 25% range, with subcanopy cover somewhat greater (25 to 60%). But it is not unusual to have coverages greater than 60% for one or both strata. Doghair patches are common in this type. Typically, the understory is relatively sparse. *Juniperus communis* occurs consistently in the short shrub stratum, but is rarely abundant. Herbaceous cover is often less than 10% and usually less than 25%. Species composition is variable. *Carex rossii* and *Danthonia spicata* frequently were found in this type.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G4?

RANK JUSTIFICATION

DATABASE CODE CEGLO00859

COMMENTS

Globally

The canopy in this type is usually moderately closed but can become nearly closed in undisturbed stands (i.e., where the natural disturbance regime has been disrupted).

The stands used to document the *Pinus ponderosa* / *Juniperus communis* Habitat Type described by Hoffman and Alexander (1987) and Hansen and Hoffman (1988) had very high basal area and densities for a woodland, possibly due to their sampling procedure. The dense structure may have affected the floristic makeup of the stands. Additionally, there is some ambiguity between this type as a forest or woodland; in increasingly dense stands, this

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type has >60% canopy closure.

Mount Rushmore National Memorial

This community often occurs in mosaics with other pine communities, especially *Pinus ponderosa* / *Oryzopsis asperifolia* Woodland.

REFERENCES

- Hansen, P. L. and G. R. Hoffman. 1988. The vegetation of the Grand River/ Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A habitat type classification. General Technical Report RM-157. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 68 p.
- Hoffman, G. R. and R. R. Alexander. 1976. Forest vegetation of the Bighorn Mountains, Wyoming: A habitat type classification. Research Paper RM-170. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 38 p.
- Hoffman, G. R. and R. R. Alexander. 1987. Forest vegetation of the Black Hills National Forest of South Dakota and Wyoming: A habitat type classification. Research Paper RM-276. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 48 p.
- Johnston, B. C. 1987. Plant associations of region two. R2-ECOL-87-2. USDA Forest Service, Rocky Mountain Region, Lakewood, CO. 429 p.
- Jones, G. 1992. Wyoming plant community classification. Unpublished draft. Wyoming Natural Diversity Database, The Nature Conservancy, Laramie, WY.
- McAdams, A. G., D. A. Stutzman, and D. Faber-Langendoen. 1998. Black Hills Community Inventory, unpublished data. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.
- Thilenius, J. F. 1970. An isolated occurrence of limber pine (*Pinus flexilis* James) in the Black Hills of South Dakota. American Midland Naturalist 84(2):411-417.

Pinus ponderosa / Oryzopsis asperifolia Woodland

COMMON NAME	Ponderosa Pine / Rough-Leaved Ricegrass Woodland
SYNONYM	Ponderosa Pine / Rough-Leaved Ricegrass Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a.)

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Mount Rushmore National Memorial

ALLIANCE *Pinus ponderosa* Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community is described only in western South Dakota.

Mount Rushmore National Memorial

This community is widespread and was found throughout the study area.

ENVIRONMENTAL DESCRIPTION

Globally

This community has been found on flat to moderately sloping topography (2-24%) (Hoffman and Alexander 1987). The soils range from sandy loams to silt loams. This type is generally found on north aspects.

Mount Rushmore National Memorial

This community occurs on gentle to moderate slopes (typically less than 20 degrees) with a variety of aspects in areas underlain by granite and schist.

MOST ABUNDANT SPECIES

Globally

Stratum

Species

Tree canopy

Pinus ponderosa

Short shrub

Arctostaphylos uva-ursi, *Spiraea betulifolia*, *Symphoricarpos albus*,

Herbaceous

Carex foenea, *Danthonia spicata*, *Oryzopsis asperifolia*, *Schizachne purpurescens*

Mount Rushmore National Memorial

Stratum

Species

Tree canopy

Pinus ponderosa

Subcanopy

Pinus ponderosa

Herbaceous

Oryzopsis asperifolia

DIAGNOSTIC SPECIES

Globally

Pinus ponderosa, *Symphoricarpos albus*, *Oryzopsis asperifolia*

Mount Rushmore National Memorial

Pinus ponderosa, *Oryzopsis asperifolia*

VEGETATION DESCRIPTION

Globally

This community is dominated by *Pinus ponderosa* in the overstory and *Oryzopsis asperifolia* in the herbaceous layer. Shrubs are scattered but readily apparent, particularly *Spiraea betulifolia*, *Arctostaphylos uva-ursi*, and *Symphoricarpos albus*. *Carex foenea*, *Danthonia spicata*, *Galium boreale*, and *Schizachne purpurescens* are present in the herb layer. In the stands in the Black Hills on which this description is based, shrubs had 10% cover and herbaceous species 20-25% cover (Hoffman and Alexander 1987).

Mount Rushmore National Memorial

This community is dominated by *Pinus ponderosa* in both the canopy and subcanopy. Coverage for each stratum typically ranges from 10 to 60%. A short shrub stratum usually is present, but species composition is variable. *Juniperus communis* and *Symphoricarpos albus* occur most consistently. Herbaceous cover typically is 10 to 25% but can be greater locally. A wide variety of species may be present. *Oryzopsis asperifolia* occurs consistently but is not abundant.

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OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G?

RANK JUSTIFICATION

DATABASE CODE Cegl002123

COMMENTS

Globally

Fire likely played an important role in the dynamics of this woodland type. Fire scars are apparent on many of the older trees.

The stands used to document the *Pinus ponderosa* / *Oryzopsis asperifolia* Habitat Type described by Hoffman and Alexander (1987) had very high basal area and densities for a woodland, possibly due to their sampling procedure. The dense structure may have affected the floristic makeup of the stands and made the list of dominant species a poor reflection of the community as a whole. This community is described on the basis of 4 stands in the Black Hills National Forest. This type was originally described as a phase of *Pinus ponderosa* / *Symphoricarpos albus* Habitat Type. More information needs to be collected on it to verify its diagnostic features and relationship to other communities.

Mount Rushmore National Memorial

This community often occurs in mosaics with the *Pinus ponderosa* / *Juniperus communis* Woodland.

REFERENCES

Hoffman, G. R. and R. R. Alexander. 1987. Forest vegetation of the Black Hills National Forest of South Dakota and Wyoming: A habitat type classification. Research Paper RM-276. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 48 p.

McAdams, A. G., D. A. Stutzman, and D. Faber-Langendoen. 1998. Black Hills Community Inventory, unpublished data. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.

***Pinus ponderosa* / *Quercus macrocarpa* Woodland**

COMMON NAME	Ponderosa Pine / Bur Oak Woodland
SYNONYM	Ponderosa Pine / Bur Oak Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a.)
ALLIANCE	<i>Pinus ponderosa</i> Woodland Alliance
CLASSIFICATION CONFIDENCE LEVEL	1

USFWS WETLAND SYSTEM Upland

USGS-NPS Vegetation Mapping Program

Mount Rushmore National Memorial

RANGE

Globally

This community is found in northeastern Wyoming and in parts of southeastern Montana and western South Dakota.

Mount Rushmore National Memorial

This community occurs most commonly in drainages in the eastern half of the study area (east of Mt. Rushmore).

ENVIRONMENTAL DESCRIPTION

Globally

This community is found on rolling hills and ridgetops on calcareous substrates (Hoffman and Alexander 1987, Johnston 1987). Hoffman and Alexander report that it may also occur on soils derived from igneous substrates. The soils are sandy loams to clayey loams with a pH of 5.3-6.0.

Mount Rushmore National Memorial

Stands of this community were found typically in drainage bottoms. Stands of pine with significant amounts of oak occasionally are found on slopes.

MOST ABUNDANT SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i>
Subcanopy	<i>Quercus macrocarpa</i>
Short shrub	<i>Amelanchier alnifolia</i> , <i>Mahonia repens</i> , <i>Prunus virginiana</i>
Herbaceous	<i>Carex foenea</i> , <i>Galium boreale</i> , <i>Maianthemum stellatum</i> , <i>Oryzopsis asperifolia</i> , <i>Vicia americana</i>

Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i> , <i>Quercus macrocarpa</i>
Subcanopy	<i>Pinus ponderosa</i> , <i>Quercus macrocarpa</i>
Short shrub	<i>Symphoricarpos</i> spp.

DIAGNOSTIC SPECIES

Globally

Pinus ponderosa, *Quercus macrocarpa*

Mount Rushmore National Memorial

Pinus ponderosa, *Quercus macrocarpa*

VEGETATION DESCRIPTION

Globally

Pinus ponderosa is the only species found in the canopy in most stands of this community. Hoffman and Alexander (1987) sampled 4 stands of this type and found an average basal area of 36.2 m²/ha and an average density of 587 trees/ha. *Quercus macrocarpa* forms a discontinuous subcanopy with an average cover of 18%. Common shrubs are *Amelanchier alnifolia*, *Mahonia repens*, *Prunus virginiana*, and *Spiraea betulifolia*. Typical herbaceous species are *Carex foenea*, *Apocynum androsaemifolium*, *Galium boreale*, *Maianthemum stellatum*, *Oryzopsis asperifolia*, *Lupinus argenteus*, and *Vicia americana*. Hoffman and Alexander (1987) found the cover by strata was shrubs - 60%, and herbaceous - 18%.

Mount Rushmore National Memorial

Stands of this vegetation type are dominated by both *Pinus ponderosa* and *Quercus macrocarpa*. *Q. macrocarpa* may occur as occasional individuals in other pine types also. *Populus tremuloides* occasionally is present and may contribute significantly to the canopy. Canopy or subcanopy coverage often is greater than 60%. Stand structure varies. In some stands, *Q. macrocarpa* forms the canopy with an occasional emergent *P. ponderosa*. In other situations, *P. ponderosa* forms a sparse canopy with *Q. macrocarpa* and *P. ponderosa* in the understory. *Prunus virginiana* and *Symphoricarpos* spp. are the most common shrub species. Herbaceous cover usually is greater than

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60% with a variety of species present.

OTHER NOTEWORTHY SPECIES

CONSERVATION RANK G3

RANK JUSTIFICATION

DATABASE CODE C EGL000873

COMMENTS

Globally

Periodic fires are probably important in promoting oak regeneration.

The stands used to document the *Pinus ponderosa* / *Quercus macrocarpa* Habitat Type described by Hoffman and Alexander (1987) had very high basal area and densities for a woodland, possibly due to their sampling procedure. The dense structure may have affected the floristic makeup of the stands.

REFERENCES

Hoffman, G. R. and R. R. Alexander. 1987. Forest vegetation of the Black Hills National Forest of South Dakota and Wyoming: a habitat type classification. Research Paper RM-276. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 48 p.

Johnston, B. 1987. Plant associations of region two. R2-ECOL-87-2. USDA Forest Service, Rocky Mountain Region, Lakewood, CO. 429 p.

McAdams, A. G., D. A. Stutzman, and D. Faber-Langendoen. 1998. Black Hills Community Inventory, unpublished data. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.

Thilenius, J. F. 1972. Classification of deer habitat in the ponderosa pine forest of the Black Hills, South Dakota. USDA Forest Service Research Paper RM-1, Fort Collins, CO. 28 p.

Carex lanuginosa - Calamagrostis stricta Herbaceous Vegetation

COMMON NAME	Woolly Sedge - Bluejoint Sp. Herbaceous Vegetation
SYNONYM	Bluejoint - Woolly Sedge Wet Meadow
PHYSIOGNOMIC CLASS	Herbaceous (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (V.A.5.N)
FORMATION	Temporarily flooded temperate or subpolar grassland (V.A.5.N.j)
ALLIANCE	<i>Carex lanuginosa</i> Temporarily Flooded Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	2
USFWS WETLAND SYSTEM	Palustrine

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Mount Rushmore National Memorial

RANGE

Globally

This community is found in Saskatchewan, Manitoba, western Minnesota, North Dakota, South Dakota, and Iowa.

Mount Rushmore National Memorial

Wetlands were found at widely-scattered locations in the west half of the study area (west of Mt. Rushmore). This community was found in Starling Basin in the Memorial west of Mount Rushmore.

ENVIRONMENTAL DESCRIPTION

Globally

This community occurs on level ground in shallow depressions and other lowlands on poorly drained sandy, loamy, or silty clay soils. Standing water can be present for a few to several weeks a year (Dix and Smeins 1967, Smeins and Olsen 1970). Soil pH is circumneutral to somewhat alkaline and organic content can be moderately high.

Mount Rushmore National Memorial

This community was found in a drainage bottoms.

MOST ABUNDANT SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
Herbaceous	<i>Calamagrostis stricta</i> , <i>Carex lanuginosa</i> , <i>Carex sartwellii</i> , <i>Juncus balticus</i>

Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
Herbaceous	<i>Calamagrostis stricta</i> , <i>Poa palustris</i> , <i>Scirpus microcarpus</i>

DIAGNOSTIC SPECIES

Globally

Carex lanuginosa, *Calamagrostis stricta*

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Calamagrostis stricta

VEGETATION DESCRIPTION

Globally

The vegetation of this community provides approximately 100% cover and the dominant vegetation is graminoids, typically 0.3-1.0 m tall. Forbs can be common; they had 25% relative cover in the stands studied by Nelson et al. (1981), but shrubs are very rare. The most abundant species are *Calamagrostis stricta*, *Carex lanuginosa*, *C. sartwellii*, *Anemone canadensis*, *Apocynum cannabinum*, *Aster lanceolatus*, *Eleocharis compressa*, *Juncus balticus*, *Phalaris arundinacea*, *Polygonum amphibium*, and *Scirpus americanus*. *Carex buxbaumii* can be common, except in North Dakota.

Mount Rushmore National Memorial

A single stand of this vegetation type was sampled, in the drainage west of Mt. Rushmore (Starling Basin). This is an area of old beaver ponds undergoing succession, and the vegetation is a complex of types arranged on an environmental gradient from wet to dry. Included are open water, stands of *Typha latifolia* and graminoid-dominated meadow. Common meadow species include *Scirpus microcarpus*, *Calamagrostis stricta*, and *Poa palustris*. In drier areas, understory species from adjacent *Betula papyrifera* / *Corylus cornuta* Forest become common, including *Heracleum sphondylium*, *Lysimachia ciliata*, *Osmorhiza* sp., and *Galium triflorum*.

OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G?

RANK JUSTIFICATION

DATABASE CODE C EGL002254

COMMENTS

Mount Rushmore National Memorial

The small size and steep environmental gradient make linking the single stand of this type to the national classification somewhat difficult. Further comparison with wetlands found in the Black Hills may result in a re-assignment of the global name.

REFERENCES

Dix, R. L. and F. E. Smeins. 1967. The prairie, meadow, and marsh vegetation of Nelson County, North Dakota. Canadian Journal of Botany 45:21-58.

Nelson, W. T., W. T. Barker, and Harold Goetz. 1981. Habitat type classification of grasslands of Sheyenne National Grassland of southeastern North Dakota. Cooperative agreement No RM-80-139-CA.

Smeins, F. E. and D. E. Olsen. 1979. Species composition and production of a native northwestern Minnesota tall grass prairie. American Midland Naturalist 84(2):398-410.

Pinus ponderosa / Schizachyrium scoparium Wooded Herbaceous Vegetation

COMMON NAME	Ponderosa Pine / Little Bluestem Wooded Herbaceous Vegetation
SYNONYM	Ponderosa Pine / Little Bluestem Savanna
PHYSIOGNOMIC CLASS	Herbaceous vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland with a sparse tree layer (V.A.6)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (V.A.6.N)
FORMATION	Medium-tall temperate or subpolar grassland with a sparse needle-leaved evergreen or mixed tree layer (V.A.6.N.f.)
ALLIANCE	<i>Pinus ponderosa</i> Wooded Medium-tall Herbaceous Alliance
CLASSIFICATION CONFIDENCE LEVEL	1
USFWS WETLAND SYSTEM	Upland

RANGE

Globally

Currently reported from western Nebraska, South Dakota, and Wyoming; it is unknown if it also occurs in Montana and Colorado.

Mount Rushmore National Memorial

This community occurs at widely-scattered sites, generally outside the Memorial boundaries. It is not common.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found on loamy, sandy, or rocky soil. It is usually found on gentle to moderate slopes. Parent

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Mount Rushmore National Memorial

material is usually either sandstone or limestone (McAdams et. al 1998).

Mount Rushmore National Memorial

Stands of this community were observed on slopes ranging from 13 to 24 degrees with southerly and westerly aspects, in areas underlain by schist.

MOST ABUNDANT SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i> , <i>Juniperus scopulorum</i>
Short shrub	<i>Rhus trilobata</i> , <i>Symphoricarpos occidentalis</i>
Herbaceous	<i>Bouteloua gracilis</i> , <i>Carex filifolia</i> , <i>Schizachyrium scoparium</i>

Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
Tree canopy	<i>Pinus ponderosa</i>
Subcanopy	<i>Pinus ponderosa</i>
Short shrub	<i>Juniperus communis</i>
Herbaceous	<i>Schizachyrium scoparium</i>

DIAGNOSTIC SPECIES

Globally

Pinus ponderosa, *Schizachyrium scoparium*, *Yucca glauca*, *Opuntia* spp.

Mount Rushmore National Memorial

Pinus ponderosa, *Schizachyrium scoparium*

VEGETATION DESCRIPTION

Globally

This community has scattered mature trees with a fairly continuous graminoid understory. *Pinus ponderosa* is the most abundant tree species, sometimes with *Juniperus scopulorum* present as small trees or tall shrubs. The most abundant graminoids in the understory are *Schizachyrium scoparium*, *Stipa comata*, *Carex filifolia*, *Bouteloua gracilis*, and *B. curtipendula*. *Calamovilfa longifolia* and *Koeleria macrantha* may be found on sandy soils in the eastern part of this community's range. Forbs that may be present include *Gaura coccinea*, *Psoraleidum lanceolatum*, and *Asclepias pumila*. In addition to the herbaceous species, shrubs such as *Symphoricarpos occidentalis*, *Rhus trilobata*, and *Cercocarpus montanus* are sometimes found in this community.

Mount Rushmore National Memorial

This community is dominated by *Pinus ponderosa* in the canopy and subcanopy, and by *Schizachyrium scoparium* in the understory. *Juniperus communis* (short shrub) was observed consistently but was never abundant. Canopy and subcanopy coverages are moderate to high (50 to 100%) while herbaceous cover generally is greater than 50%.

OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G2G3

RANK JUSTIFICATION

There are probably fewer than 100 occurrences in a restricted range in the northwestern Great Plains. Three occurrences are currently documented, one from South Dakota, and two from Nebraska. Over 8000 acres are currently documented, and at least that much is expected in other occurrences. Two of the currently documented occurrences are in fair condition; it seems likely that occurrences have been degraded by cattle grazing.

DATABASE CODE Cegl002019

COMMENTS

Globally

Periodic fires are probably important in maintaining the open grassland understory of this type.

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Mount Rushmore National Memorial

This community often occurs in mosaics with other pine types, especially the *Pinus ponderosa* / *Oryzopsis asperifolia* Woodland and *Pinus ponderosa* / *Juniperus communis* Woodland.

This community differs significantly from stands at lower elevations in the Black Hills, where this vegetation type is common. In those lower areas, canopy coverage typically is less than 25%, subcanopy is sparse to absent, and herbaceous cover is higher and more diverse, consisting predominantly of prairie species.

REFERENCES

Hayward, H. H. 1928. Studies of plants in the Black Hills of South Dakota. Botanical Gazette 85(4):353-412.

McAdams, A. G., D. A. Stutzman, and D. Faber-Langendoen. 1998. Black Hills Community Inventory, unpublished data. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.

Steinauer, G. 1989. Characterization of the natural communities of Nebraska. Pp. 103-141, in, M. Clausen, M. Fritz, and G. Steinauer. The Nebraska Natural Heritage Program, Two Year Progress Report, Appendix D. Lincoln, NE.

Black Hills Rock Outcrop Sparse Vegetation

COMMON NAME	Black Hills Rock Outcrop Sparse Vegetation
SYNONYM	Black Hills Rock Outcrop
PHYSIOGNOMIC CLASS	Sparse vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated cliffs (VII.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/semi-natural (VII.A.1.N)
FORMATION	Cliffs with sparse vascular vegetation (VII.A.1.N.a.)
ALLIANCE	Rock Outcrop / Butte Sparse Vegetation

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM Upland

RANGE

Globally

This community has only been identified in western South Dakota.

Mount Rushmore National Memorial

This vegetation type occurs throughout the study area. Granite outcrops are best developed in the central and western parts of the study area. Schists are more abundant to the east.

ENVIRONMENTAL DESCRIPTION

Globally

This community is found where granite or schist bedrock is exposed in the higher areas of the Black Hills. Slopes range from none (flat) to steep. There is little soil development; what soil there is can be found in cracks and

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depressions in the rock surface.

Mount Rushmore National Memorial

This community occurs in areas with large exposures of granite and schist. Plants occurs on soil pockets and in cracks on the outcrops.

MOST ABUNDANT SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
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Information not available.

Mount Rushmore National Memorial

<u>Stratum</u>	<u>Species</u>
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Tree canopy	<i>Pinus ponderosa</i>
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Short shrub	<i>Arctostaphylos uva-ursi</i> , <i>Juniperus communis</i>
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DIAGNOSTIC SPECIES

Globally

Information not available.

Mount Rushmore National Memorial

large, sparsely vegetated rock outcrops

VEGETATION DESCRIPTION

Globally

Few vascular plants grow in this community, although lichens are common. Widely scattered *Pinus ponderosa* grow where there is enough soil to support their roots. Dwarf-shrubs and herbaceous species such as *Arctostaphylos uva-ursi*, *Juniperus communis*, and *Carex inops* ssp. *heliophila* can be found in soil pockets as well.

Mount Rushmore National Memorial

This vegetation type consists of sparse vascular plant cover, typically with a few scattered *Pinus ponderosa* trees growing in cracks. Lichens are common. On granite outcrops, mats of *Arctostaphylos uva-ursi* on pockets of soil.

OTHER NOTEWORTHY SPECIES Information not available.

CONSERVATION RANK G4G5

RANK JUSTIFICATION

DATABASE CODE C EGL002295

COMMENTS

Mount Rushmore National Memorial This type is often found in mosaics with *Pinus ponderosa* / *Arctostaphylos uva-ursi* Woodland and *Pinus ponderosa* / *Juniperus communis* Woodland.

REFERENCES