

USGS-NPS Vegetation Mapping Program
Badlands National Park

Great Plains Badlands Sparse Vegetation Complex

COMMON NAME Great Plains Badlands Sparse Vegetation Complex
SYNONYM Great Plains Badlands Complex
PHYSIOGNOMIC CLASS ()
PHYSIOGNOMIC SUBCLASS ()
PHYSIOGNOMIC GROUP ()
PHYSIOGNOMIC SUBGROUP ()
FORMATION ()
ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM Terrestrial

RANGE

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Badland formations are widespread within Badlands NP, covering approximately 45% of the park area, and are exposed as spires, cliffs, ridges, slopes, narrow gorges, buttes, mounds, fans, and drainages.

Globally

This complex is found in the badlands formations of the western Great Plains of the United States and Canada.

ENVIRONMENTAL DESCRIPTION

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The Badlands Sparse Vegetation Complex is found on eroded formations of Cretaceous Pierre shale, Oligocene Brule siltstone and Chadron clayey mudstone and shale, and Miocene Arickaree sandstone. Brule formation siltstone is often capped by Rocky Ford volcanic ash and may also contain veins of chalcedony. Soils are undeveloped, poor, loose, and easily eroded; the topography ranges from flat to vertical.

Globally

Badlands are produced by a combination of factors, including elevation, type of rainfall, carving action of streams, and a particular material. Badlands are basically a type of mature dissection with a finely-textured drainage pattern and steep slopes. Badlands can only form where the land lies well above its local base level. The land must also be easily erodable, or vegetation cover will stabilize the surface. An arid climate will also discourage vegetation growth and will tend to have infrequent, but torrential, rains with great eroding action. In the Great Plains, the geologic formations forming the badlands complex include Cretaceous shales, Oligocene siltstones, sandstones, and clayey mudstones (Von Loh *et al.* 1999). The soils in the Great Plains badlands complex are generally poorly consolidated clays with bands of sandstone or isolated conglomerates (Froiland 1990).

MOST ABUNDANT SPECIES

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<u>Stratum</u>	<u>Species</u>
Shrub	<i>Chrysothamnus nauseosus</i> , <i>Gutierrezia sarothrae</i> , <i>Eriogonum pauciflorum</i>
Herbaceous	<i>Oenothera cespitosa</i> , <i>Atriplex argentea</i> , <i>Grindelia squarrosa</i>

Globally

<u>Stratum</u>	<u>Species</u>
Short Shrub	<i>Eriogonum pauciflorum</i> , <i>Gutierrezia sarothrae</i> , <i>Opuntia polyacantha</i>
Forb	<i>Atriplex argentea</i> , <i>Cryptantha thyrsoflora</i> , <i>Grindelia squarrosa</i>

CHARACTERISTIC SPECIES

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Eriogonum pauciflorum, *Gutierrezia sarothrae*, *Chrysothamnus nauseosus*, *Sarcobatus vermiculatus*, *Atriplex canescens*, *Artemisia longifolia*, *Grindelia squarrosa*, *Atriplex argentea*, *Oenothera cespitosa*

Globally

Atriplex argentea, *Atriplex canescens*, *Cryptantha thyrsoflora*, *Eriogonum pauciflorum*, *Grindelia squarrosa*, *Gutierrezia sarothrae*, *Opuntia polyacantha*

OTHER NOTABLE SPECIES

Globally

<u>Stratum</u>	<u>Species</u>
Forb	<i>Astragalus barrii</i> , <i>Eriogonum visherii</i> , <i>Oenothera cespitosa</i>

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VEGETATION DESCRIPTION

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The Badlands Sparse Vegetation Complex rarely exceeds 10% vegetative cover and is usually <5% vegetative cover. On most level terrain, the vegetation is relatively evenly distributed, but on steeper slopes and cliffs the vegetation may grow in patches and in rows or seams. Plant species that are often present include small-flowered wild buckwheat (*Eriogonum pauciflorum*), snakeweed (*Gutierrezia sarothrae*), rabbitbrush (*Chrysothamnus nauseosus*), curlycup gumweed (*Grindelia squarrosa*), and gumbo lily (*Oenothera cespitosa*). Other, less common species include *Atriplex canescens*, *Artemisia longifolia*, *Grindelia squarrosa*, and *Atriplex argentea*.

Globally

This badlands community complex varies from stands with virtually no vegetation (eroding slopes and badland walls) to stands that may exceed 10% vegetative cover, but more often are less than 5%. On level terrain, the vegetation is relatively evenly distributed, but on steeper slopes and cliffs the vegetation may grow in patches and in rows or seams. Plant species that are nearly always present include the dwarf-shrubs *Eriogonum pauciflorum*, *Gutierrezia sarothrae*, *Opuntia polyacantha*, *Atriplex argentea*, and *Cryptantha thyrsoifolia*, and the forb *Grindelia squarrosa*. *Atriplex canescens* dwarf-shrubs were observed throughout the type, but were typically short-statured and scattered in distribution (Von Loh *et al.* 1999). *Eriogonum visherii*, a spring annual, is a rare plant found primarily in badlands in the Dakotas (Froiland 1990). *Astragalus barrii* is another uncommon Great Plains species that is associated with these badlands habitats (Froiland 1990).

CONSERVATION RANK G5. This badlands complex is somewhat restricted in distribution, occurring in selected localities where geologic conditions are right for its formation, but it is a rugged, persistent type, with extensive areas protected.

DATABASE CODE CECX002004

MAP UNITS The Badlands Sparse Vegetation Complex is mapped as a single unit, Map Class 2 (Badlands Sparse Vegetation Complex) on the vegetation map. None of the 4 component associations were mapped separately.

SIMILAR ASSOCIATIONS

COMMENTS

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Many badlands sparse vegetation sites were visited, and the complex was well-surveyed into four component associations during preparation of the vegetation map. These four associations are: *Artemisia longifolia* Badlands Sparse Vegetation, *Eriogonum pauciflorum* - *Gutierrezia sarothrae* Badlands Sparse Vegetation, Eroding Great Plains Badlands Sparse Vegetation, and Shale Barren Slopes Sparse Vegetation. Each association is described elsewhere in this report.

The Badlands Sparse Vegetation Complex occupies naturally eroded features of the Pierre shale, Brule siltstone, and Chadron clayey mudstone and shale formations. The vegetation is evenly distributed across relatively flat and rolling sites, but is patchy or even linear on steeper slopes and along drainages. Many truly barren cliffs, slopes and mounds are present. Badlands formations shed water rapidly following precipitation events and reflect a tremendous amount of solar energy.

Globally

Four associations are currently included in the complex, based on work in South Dakota: CEG002050, CEG002195, CEG002294, CEG00005270. Other associations may be added with further range-wide review: e.g. CEG000993.

REFERENCES

- Froiland, S.G. 1990. Natural History of the Black Hills and Badlands. The Center For Western Studies, Augustana College, Sioux Falls, South Dakota. 224 pp.
- Von Loh, J., D. Cogan, D. Faber-Langendoen, D. Crawford, and M. Pucherelli. 1999. USGS-NPS Vegetation Mapping Program, Badlands National Park, South Dakota (Final Report). Technical Memorandum No. 8260-00-02. U.S. Bureau of Reclamation Technical Service Center. Denver Colorado.