Plant community descriptions that follow are organized within the hierarchical framework of the National Vegetation Standard (FGDC 1997). These descriptions exhibit varying degrees of completeness. The most complete plant association descriptions are generally taken from the International Classification of Ecological Communities maintained by NatureServe and updated by state Natural Heritage programs (NatureServe 2002). A few plant associations recently described by the Montana Natural Heritage Program have been nominated for inclusion into the International Classification; these associations are identified by the identifier prefix CEGLMTHP.

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References
I. FOREST

I.A.8.N.b. Rounded-crowned temperate or subpolar needle-leaved evergreen forest
I.A.8.N.b.10. PINUS PONDEROSA FOREST ALLIANCE

**PINUS PONDEROSA / PRUNUS VIRGINIANA FOREST**
Ponderosa Pine / Choke Cherry Forest

**Summary:** This community type is found in the Black Hills and northeastern Rocky Mountains, and western Great Plains escarpments of the United States. It occurs on gentle to moderate (2-40%), north-facing slopes and close to streams. A few stands are on rolling uplands. The soils are sandy loam or loam. This forest community has a closed canopy of *Pinus ponderosa*. Seedlings and saplings of *Crataegus succulenta* and *Fraxinus pennsylvanica* are often scattered in the understory. These species may grow to be mature trees near streams. There are two shrub layers in this community. The most prominent layer is approximately 1 m tall and dominated by *Prunus virginiana*. *Amelanchier alnifolia* also contributes significantly to this layer. The lower shrub layer is approximately 50 cm tall. It is dominated by *Mahonia repens* with lesser amounts of *Juniperus communis*, *Ribes missouriense*, *Rosa woodsii*, *Symphoricarpos albus*, and *Toxicodendron rydbergii*. The diversity of forbs is moderate, but most of the coverage of the herbaceous layer is provided by graminoids. *Apocynum androsaemifolium*, *Elymus caninus*, *Carex inopis ssp. heliophila*, *Galium boreale*, *Schizachne purpurascens*, and *Maianthemum stellatum* are typical components of the herbaceous layer.

**Environment:** This is one of the most mesic ponderosa pine communities. It occurs on gentle to moderate (2-40%) north-facing slopes and close to streams (Hansen and Hoffman 1988). A few stands are on rolling uplands. The soils are sandy loam or loam.

**Vegetation:** This forest community has a closed canopy made up of *Pinus ponderosa*. Hansen and Hoffman (1988) found that the basal area ranged from 36.6-63.5 m²/ha in five stands in southeastern Montana. Seedlings and saplings of *Crataegus succulenta* and *Fraxinus pennsylvanica* are often scattered in the understory. These species may grow to be mature trees near streams. Here are two shrub layers in this community. Together they had an average cover of 87% in five stands sampled by Hansen and Hoffman (1988). The most prominent layer is approximately 1 m tall and dominated by *Prunus virginiana*. *Amelanchier alnifolia* also contributes significantly to this layer. The lower shrub layer is approximately 50 cm tall. It is dominated by *Mahonia repens* with lesser amounts of *Juniperus communis*, *Ribes missouriense*, *Rosa woodsii*, *Symphoricarpos albus*, and *Toxicodendron rydbergii*. The diversity of forbs is moderate, but most of the coverage of the herbaceous layer is provided by graminoids. *Apocynum androsaemifolium*, *Elymus caninus*, *Carex inopis ssp. heliophila*, *Galium boreale*, *Schizachne purpurascens*, and *Maianthemum stellatum* are typical components of the herbaceous layer.

**Dynamics:** Signs of fire were noted by Hansen and Hoffman (1988). This community may be regularly affected by ground fires.

**GRank & Reasons:** G3 (00-03-16).

**Comments:** In Nebraska, see comments in Steinauer and Rolfsmeyer (2000). In the Black Hills, see Marriott and Faber-Langendoen (2000).

**ELEMENT DISTRIBUTION**

**Range:** This community type is found in the Black Hills and northeastern Rocky Mountains, and western Great Plains escarpments of the United States, ranging from eastern Montana south to western Nebraska.

**States/Provinces:** MT:S4, NE:S2, SD:S4, WY?
ELEMENT SOURCES

Authors: J. Drake, MCS
Confidence: 1
Identifier: CEGLO000192

II. WOODLAND

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

II.A.4.N.A.8. JUNIPERUS SCOPULORUM WOODLAND ALLIANCE

**JUNIPERUS SCOPULORUM / PIPTATHERUM MICRANTHUM WOODLAND**
Rocky Mountain Juniper / Little-seed Mountain Ricegrass Woodland

**ELEMENT CONCEPT**

**Summary:** This rocky mountain juniper community type is found in the western Great Plains of the United States. Stands occur almost exclusively on steep (30-70%) north-facing slopes. The soils are shallow and poorly developed; loamy sands and sandy loams predominate. The vegetation structure and composition is an evergreen woodland with moderately open to dense cover of *Juniperus scopulorum*, *Juniperus virginiana*, or introgressant hybrids of the two. Woody species other than *Juniperus scopulorum* or *Juniperus virginiana* occur sporadically, but none achieves prominence. Most of the trees are small (10-20 cm dbh) and few exceed 6 m. Where the density of the tree canopy is high, the short-shrub and herbaceous strata are not well-developed. In more open places *Piptatherum micranthum* (= *Oryzopsis micrantha*) is often abundant. Other common herbaceous species include *Campanula rotundifolia*, *Galium boreale*, and *Maianthemum stellatum*. Mosses and lichens can cover much of the ground.

In Montana, only *Juniperus scopulorum* is present and dominant. This plant association is best-developed on sheltered aspects in dissected sedimentary plains. In Powder River County, this plant association is widely-scattered on escarpments, and dissected terrain along the south end of the Powder River.

**Environment:** This community typically occurs on moderate to steep (16-70%), north-facing slopes, but can occur on a variety of aspects (Johnston 1987, Von Loh et al. 1999). The soils are poorly developed, shallow, loamy sands, sandy loams, and clay loams, sometimes with high gravel content. These woodlands are frequently associated with outcrops of sandstone (DeVelice et al. 1995) or scoria and clay slopes (Girard et al. 1989). In Montana, this plant association occurs in a variety of Silty Ecological Sites that are well-drained owing to the slope and the gully-erosion in these settings. This community is best-developed on north aspects.

In Powder River County, this type was found on thin silty ecological conditions. This is consistent with other Montana state data, with exception of thin clay conditions noted in Carter County (Vanderhorst et al. 1998).

**Vegetation:** This woodland community is dominated by small *Juniperus scopulorum* trees through most of its range, and is replaced by *Juniperus virginiana* and introgressant hybrids in the eastern portion of its range in Nebraska and South Dakota (Kaul et al. 1983, Von Loh et al. 1999). *Acer negundo* and *Fraxinus pennsylvanica* saplings are sometimes found in depressions where soil and moisture accumulate. Most of the juniper trees are 10-20 cm dbh and 4-6 m tall, but some trees can be up to 30-40 cm dbh. The basal area has been reported at 22-29 m²/ha in North Dakota and up to 22-41 m²/ha in southeastern Montana and northwestern South Dakota (Nelson 1961, Hansen et al. 1984, Hansen and Hoffman 1988). Tree canopy is moderate to dense, e.g., in North Dakota, Girard et al. (1989) measured densities of 975 trees/ha. Where the canopy is dense the shrub and herbaceous strata are poorly developed. Where the canopy is less full, shrubs and herbaceous species are more abundant, e.g., on 7 stands in southwest North Dakota mosses and lichens covered 72% of the ground surface, shrubs covered 17.4%; graminoids 69.1%, and forbs 9.4% (Hansen et al. 1984). Among the shrubs that may be found in this community are *Juniperus communis*, *Juniperus horizontalis*, small *Juniperus scopulorum* or *Juniperus virginiana*, *Mahonia repens*, *Dasiophora fruticosa* ssp. *floribunda*, *Prunus virginiana*, *Rhus trilobata*, *Ribes aureum*, *Ribes cereum*, *Rosa woodsii*, *Symphoricarpos albus*, and *Symphoricarpos occidentalis*. Typical herbaceous species include *Pulsatilla patens* ssp. *multifida* (= *Anemone patens*), *Antennaria microphylla*, *Campanula rotundifolia*, *Carex inops* ssp. *heliophila*, *Chenopodium fremontii*, *Elymus lanceolatus*, *Elymus trachycaulus*, *Galium boreale*, *Geum triflorum*, *Koeleria macrantha*, *Piptatherum micranthum* (= *Oryzopsis micrantha*), and *Maianthemum stellatum*, *Parietaria pensylvanica*, and *Taraxacum officinale* (Hansen et al. 1984, Appendix E-6).
In Montana, this plant association is distinguished by the palatable bunchgrass *Piptatherum micranthum* having the highest graminoid cover at generally 10-30%, the absence or paucity of bluebunch wheatgrass (*Pseudoroegneria spicata*), high nonvascular cover, and often rich forb diversity and cover (DeVelice et al. 1995, Culwell et al. 1986, Vanderhorst et al. 1998). Hybrids between *Juniperus scopulorum* and *Juniperus horizontalis* have been reported and may account for the unusual growth form of stands along the Missouri Breaks where trees do not have a central axis (Roberts et al. 1979, Heidel 1997).

**Dynamics:** This plant association is in relatively moist habitat that is not as prone to burning as surrounding vegetation types, but is highly flammable when dry. *Juniperus scopulorum* is readily killed by fire; once ignited the crowns are almost always completely incinerated.

**GRank & Reasons:** G3G4 (00-01-31). A number of sites have been impacted by cutting for fenceposts or railroad ties. Fire suppression may increase the extent of the community within its range.

**Comments:** This description includes stands with both *Juniperus scopulorum* and *Juniperus virginiana* over a herbaceous layer with *Piptatherum micranthum* (= *Oryzopsis micrantha*). *Pinus ponderosa*, if present, is less than 25% tree canopy cover.

This type closely intergrades with *Juniperus scopulorum / Pseudoroegneria spicata* and both may be represented on the same slope or on opposite aspects of the same landform as they were in the dissected terrain along the Powder River. It often has grassland or steppe openings that condition the levels of overall livestock use. Signs of fencepost-cuttings are ubiquitous in the stands and the changes brought on by this history need to be further addressed in characterizing stand structure.

**ELEMENT DISTRIBUTION**

**Range:** This rocky mountain juniper community type is found in the western Great Plains of the United States. It is found in the Black Hills and the Badlands of North and South Dakota and Montana, and from the High Plains of eastern Wyoming eastward to central Nebraska.

In Montana, this plant association is best represented on the open eastern sedimentary plains associated with river breaks and scattered escarpments. It is sometimes present at the margins of pine woodland landscapes but is not consistently part of them. In Powder River County, this plant association is present on northeastern escarpments, and valley segments of the Powder River in the southwestern corner of the County.

**States/Provinces:** MT:S3, ND:S3, NE:S4S5, SD:SU

**ELEMENT SOURCES**

**Authors:** P.L. Hansen, G.R. Hoffman, and A.J. Bjugstad; mod. J. Drake and S. Rolfsmeier, MCS; mod. B. L. Heidel, MTNHP  **Confidence:** 1  **Identifier:** CEGL000747


**JUNIPERUS SCOPULORUM / PSEUDOROEGNERIA SPICATA WOODLAND**

Rocky Mountain Juniper / Bluebunch Wheatgrass Woodland

**ELEMENT CONCEPT**

**Summary:**

**Environment:** In eastern Montana this community type is commonly found in low to moderate relief rolling uplands as well as in badland arroyos/draws, often occurring adjacent to *Juniperus scopulorum / Achnatherum hymenoides* (= *Oryzopsis hymenoides*) but on warmer exposures (not strictly north-facing) with the same moderate to steep slopes. In eastern Montana three of the four sampled stands were on calcareous substrates, though this habitat type is not confined to these substrates in this region. It has also been recorded for the Beaverhead Mountains Section occurring on rocky, primarily volcanic substrates with thin soils; substrate conditions here
appears to be the determining factors in its occurrence. It is primarily associated with lower treeline positions and slope and aspect are only weak determining factors. In eastern Montana, Juniperus scopulorum / Pseudoroegneria spicata also has more exposed soil and rock than the associated to Juniperus scopulorum / Achnatherum hymenoides, often exceeding 50%. The same situation often obtains in western Montana where bare soil and exposed rock usually constitute 60% plus of the substrate and litter is never more than 20% and adjacent shrubland types often have more developed, deeper soils.

Vegetation: As a result of the ubiquitous past cutting for fencing, stands of Juniperus scopulorum / Pseudoroegneria spicata in eastern Montana are rather open, with coverage of 8 to 12 feet tall. Juniperus scopulorum not exceeding 50%; in the Beaverhead Mountains Section, the tree canopy are also quite open (at most approaching 30% canopy cover). We speculate tree coverage does not much exceed these figures due to limitations of site factors. The higher coverage of shrubs (up to 20 % for Artemisia tridentata and ~Artemesia frigida combined) that are reported in northeastern Montana as opposed to southeastern Montana (Hansen and Hoffman 1988) is also attributable to seral conditions. In the Beaverhead Mountains Section, Artemisia tridentata ssp. ~vasseyana and ssp. wyomingensis, Artemesia frigida, Ericameria nauseosa (=Chrysothamnus nauseosus), and Chrysothamnus viscidiflorus have the highest constancy but comprise less than 5% cover in the aggregate. The undergrowth is dominated by graminoids, chief among which and diagnostic of the type is Pseudoroegneria spicata, always well represented (40% average cover in eastern Montana only 10% in SW Montana). Carex filifolia and Koeleria macrantha (=Koeleria cristata) have high constancy and Bouteloua curtipendula is consistently present in the easternmost occurrences of this type. Forb diversity is moderately high and higher in western than eastern Montana with not much overlap in high constancy species between regions; regardless of location, forb coverage’s are generally low, not exceeding 10% except in the most open stands.

Dynamics:
GRank & Reasons: G4 (96-02-01).
Comments:

ELEMENT DISTRIBUTION

Range:
States/Provinces: CO:S2S3, MT:S4, WY:S4

ELEMENT SOURCES

Authors: WCS Confidence: 1 Identifier: CEGL000748

II.A.4.N.A.32. PINUS PONDEROSA WOODLAND ALLIANCE

PINUS PONDEROSA / CAREX INOPS SSP. HELIOPHILA WOODLAND
Ponderosa Pine / Sun Sedge Woodland

ELEMENT CONCEPT

Summary: This ponderosa pine / sedge woodland community type is found in the Black Hills region, adjacent Great Plains and northern Rocky Mountain front range. Stands occur in the most mesic of the habitat types with a graminoid-dominated ground layer. They are generally found on moderate south- and west-facing slopes in the western Dakotas, and eastern parts of Wyoming and Montana. The community is dominated by Pinus ponderosa with occasional Juniperus scopulorum and Quercus macrocarpa in the subcanopy. Shrubs are relatively uncommon in this type. The herbaceous layer is dominated by Carex inops ssp. heliophila, with inclusions of Danthonia spicata, Schizachyrium scoparium, and Pseudoroegneria spicata, generally in areas with more open canopies.

Environment: This community is often found on gentle and moderate south- to west-facing slopes (Hansen and Hoffman 1988, Hoffman and Alexander 1987).
Vegetation: The tree canopy and subcanopy are dominated by *Pinus ponderosa*. *Juniperus scopulorum* and *Quercus macrocarpa* are occasionally found in the subcanopy. Shrubs are infrequent in this type. The herbaceous layer is dominated by *Carex inops* ssp. *heliophila* (sun sedge), with inclusions of *Danthonia spicata*, *Schizachyrium scoparium* and *Pseudoroegneria spicata*, generally in areas with more open canopies. At Wind Cave National Park, herbaceous cover is most commonly in the 25-50% range and occasionally greater, with sun sedge dominant. Other common herbaceous species include *Artemisia ludoviciana*, *Danthonia spicata*, *Piptatherum microanthum* (= *Oryzopsis micrantha*), *Nassella viridula*, and *Poa pratensis* (H. Marriott pers. comm. 1999).

Dynamics: This type probably develops from little bluestem prairie as pines become established. Disturbances such as fire convert stands back to prairies (Marriott and Faber-Langendoen 2000). The canopy in this type is usually moderately open due to occasional fires, but can become nearly closed in stands where the natural fire disturbance regime has been disrupted.

**GRank & Reasons:** G3G4 (00-05-26).

Comments: The stands used by Hoffman and Alexander (1987) and Hansen and Hoffman (1988) to document the *Pinus ponderosa* / *Carex inops* ssp. *heliophila* Woodland habitat type 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. This type is expected to have an open canopy where natural fire disturbances occur.

**ELEMENT DISTRIBUTION**

Range: This ponderosa pine / sedge woodland community type is found in the Black Hills region, adjacent Great Plains and northern Rocky Mountain front range from Montana, Wyoming and South Dakota south to Colorado.

**States/Provinces:** CO:S2, MT:S3S4, SD:S?, WY:S2S3

**ELEMENT SOURCES**

Authors: A.G. McAdams, WCS

Confidence: 1

Identifier: CEGL000849


**PINUS PONDEROSA / JUNIPERUS HORIZONTALIS WOODLAND**

Ponderosa Pine / Creeping Juniper Woodland

**ELEMENT CONCEPT**

Summary: This woodland association has been described from north-central (Little Rocky Mountains) and the plains of northeastern Montana. All occurrences are below 1160 m (3800 feet) on calcareous shales and sandstones of rolling uplands and foothills, generally on slope shoulders. Except for accidentals of *Pseudotsuga menziesii* and very scattered *Juniperus scopulorum*, *Pinus ponderosa* is the only tree present, with somewhat stunted specimens comprising between 40% and 70% canopy cover. The undergrowth is rather depauperate in species diversity. *Juniperus horizontalis* is always the dominant species but varies enormously in cover, from 10-70% (even greater cover noted in reconnaissance). *Juniperus communis* can also attain high cover values but is not consistently present. *Rhus trilobata* and *Artemisia tridentata* ssp. *wyomingensis* are highly constant but seldom comprise more than 5% cover. There is a strong difference between the stands in the Little Rocky Mountains, which have a very depauperate graminoid cover, and those of northeastern Montana wherein *Pseudoroegneria spicata* and *Pascopyrum smithii* can attain canopy covers of greater than 30%. The forb component seldom has more than a trace amount of any species; those with the greatest constancy are *Solidago missouriensis*, *Thermopsis rhombifolia*, and *Linum perenne*. Structurally and compositionally this association is similar to both *Pinus ponderosa* / *Juniperus communis* Woodland (CEGL000859) and *Pinus flexilis* / *Juniperus communis* Woodland (CEGL000807).

Rank & Reasons: G3? (00-01-09). This type appears to have a rather limited geographic range and few known occurrences; conversely there is an abundance of potential habitat that could support this woodland type. It is proposed that the rank be changed from G3 to G3? Queries of federal agency resource managers in eastern

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Montana resulted in no positive responses from any of them as to having seen this community. With only 6 plots documented and virtually no reconnaissance information it would seem that this type is rarer than indicated by G3 alone, but indeed it could be more common, thus the " added to rank.

Comments: Only 6 plots have been documented for this association and limited reconnaissance notes recorded in the course of the Northern Great Plains Ecoregion Rapid Ecological Survey. This type is relatively easily distinguished from other Pinus ponderosa-dominated types by its abundance of Juniperus horizontalis, though it could be confused with Pinus flexilis / Juniperus communis woodland (CEGL000807) growing on poor sites if one rushed to judgment on the tree species dominant.

ELEMENT DISTRIBUTION

Range: This woodland association has been described from the Little Rocky Mountains in north-central Montana and the plains of northeastern Montana. States/Provinces: MT:S3

ELEMENT SOURCES

Authors: S.V. Cooper, WCS  Confidence: 2  Identifier: CEGL000860  

PINUS PONDEROSA / PSEUDOROEGRNERIA SPICATA WOODLAND

Ponderosa Pine / Bluebunch Wheatgrass Woodland

ELEMENT CONCEPT

Summary: This ponderosa pine woodland is one of the drier ponderosa pine woodlands found in the northern Rocky Mountains, Inter-Mountains, and extreme northwestern Great Plains of the United States and Canada. It is found on slopes with coarse soils, often with a high gravel or rock content. Pinus ponderosa is typically the only tree in the overstory, although Juniperus scopulorum may be present in the subcanopy. It forms open to moderately closed canopies. There are very few shrubs. The herbaceous layer is dominated by Pseudoroegneria spicata. Other species found in this layer are Carex filifolia, Carex inops ssp. heliophila, Koeleria macrantha, Achillea millefolium, Balsamorhiza sagittala and Hesperostipa comata (= Stipa comata). Bare mineral soil and exposed rock are common.

Environment: This community occurs mostly on steep southerly aspects. It is found on coarse soils derived from sandstone, porcillenate, or limestone (Thilenius et al. 1995). These include sandy alluvium, gravelly or sandy till, and loams with high stone content. Rock and mineral soil are commonly exposed.

In Powder River County, MT, this plant association is found on Shallow to gravel, Sandy and Silty Ecological Sites in both 10-14 and 15-19 inch precipitation zones.

Vegetation: This community is dominated by the tree and herbaceous strata. On three stands in the eastern portion of its range, Hansen and Hoffman (1988) found that total cover by understory strata was 55%. Shrubs made up only 1.3% of this total. Pinus ponderosa is often the only tree in the overstory. The tree coverage can vary from open to moderately closed. In northeastern Wyoming, most of the trees were less than 15 m tall and 60 cm dbh (Thilenius et al. 1995). The herbaceous stratum is also open to moderately dense. Pseudoroegneria spicata is the dominant species. Other species that are often found in the central and eastern portions of its range are Achillea millefolium var. occidentalis, Carex filifolia, Carex inops ssp. heliophila, Koeleria macrantha, and Hesperostipa comata (= Stipa comata). In the western portion of this range Festuca idahoensis may be present (Daubenmire 1952). When shrubs are present they typically include Rhus aromatica and, especially on sandy soils, Ericameria nauseosa (= Chrysothamnus nauseosus).

Dynamics: Fire likely occurred at regular intervals in this type; documentation on fire frequency is not available. Despite the widely spaced trees and relative paucity, or at least patchy distribution of fuels, this type experienced predominantly stand-replacing fire in the course of the Aikali Creek burn on the CMR Wildlife Refuge. A more typical and expected response when these conditions occur in Fire Group Two (warm, dry Pinus ponderosa habitat
types; Fisher and Clayton 1983) is an underburn or surface fire. The Pinus ponderosa of this community type in the Bull Mountains and in the Alkali Creek study area generally bore no fire scars. This observation probably reflects the light fuels condition for this type and may also point to the exceptional Alkali Creek Fire conditions. The lack of Juniperus scopulorum in this type may be attributable to past fires killing this species and leaving the Pinus ponderosa overstory intact; this scenario has been documented by Culwell et al. (1991) in the Bull Mountains of central Montana.

**GRank & Reasons:** G4 (96-02-01).

**ELEMENT DISTRIBUTION**

**Range:** This ponderosa pine woodland is one of the drier ponderosa pine woodlands found in the northern Rocky Mountains, Intermountains, and extreme northwestern Great Plains of the United States and Canada, extending from the Black Hills of South Dakota and Wyoming west to Oregon, Washington, and British Columbia.

**States/Provinces:** BC:S2S3, ID:S3, MT:S4, ND:S2S3?, OR:S2, SD:S4, WA:S1, WY:S3?

**ELEMENT SOURCES**

**Authors:** Drake, J. F., WCS; Heidel, B. L. MTNHP  
**Confidence:** 1  
**Identifier:** CEGL000865


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

**II.B.2.N.B.4. POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE**

**POPULUS DELTOIDES / SYMPHORICARPOS OCCIDENTALIS WOODLAND**  
Plains Cottonwood / Western Snowberry Woodland

**ELEMENT CONCEPT**

**Summary:** This riparian woodland community is found in the northwestern Great Plains of the United States on medium to coarse-textured alluvial soils on the floodplains of major rivers. The floodplains are both seasonally inundated and subirrigated. It is found more rarely at higher elevations in the mountains of eastern Wyoming and western South Dakota. This community is dominated by a single deciduous tree species, *Populus deltoides*. In some stands other species, such as *Acer negundo* and *Fraxinus pennsylvanica*, may contribute to the canopy. The tallest trees exceed 15 m. The shrub layer is typically 0.5-1 m tall. It is dominated by *Symphoricarpos occidentalis* and commonly includes Juniperus scopulorum and *Rosa* spp. In Wyoming, *Ericameria nauseosa* (= *Chrysothamnus nauseosus*) is present and increases with heavy grazing. The herbaceous layer usually includes *Pascopyrum smithii*. Weedy species such as *Melilotus officinalis*, *Taraxacum officinale*, and *Poa secunda* are very common, especially in the presence of grazing. *Mainanthemum stellatum* is abundant only where grazing is absent.

**Environment:** This community is found on medium to coarse-textured alluvial soils on the floodplains of major rivers. The floodplains are both seasonally inundated and subirrigated (Thilenius et al. 1995). The meandering erosional and depositional pattern of rivers maintains and influences this community along rivers (Hansen et al. 1990). It is rarely found at higher elevations in the mountains of eastern Wyoming and western South Dakota (Johnston 1987).

In Montana, this plant association occurs on major river systems of the eastern plains, with a flood cycle driven by mountain run-off and vegetation succession linked to intact hydrological processes. In Powder River County, this plant association is found in Riparian subirrigated Ecological Sites along the Powder and Little Powder Rivers.

Appendix E-11
Vegetation: This community is typically dominated by a single deciduous tree species, *Populus deltoides*. In some stands other species, such as *Acer negundo* and *Fraxinus pennsylvanica*, may contribute to the canopy. The tallest trees exceed 15 m. *Populus deltoides* is a pioneer species that requires moist, sparsely vegetated alluvium to become established from seed; therefore stands of this community may be considered seral, but the stage is long persistent (up to 100 years) (Girard et al. 1989). The shrub layer is typically 0.5-1 m tall. It is dominated by *Symphoricarpos occidentalis* and commonly includes *Juniperus scopulorum* and *Rosa* spp. In Wyoming, *Ericameria nauseosa* (= *Chrysothamnus nauseosus*) is present and increases with heavy grazing (Thilenius et al. 1995). The herbaceous layer usually includes *Pascopyrum smithii* and *Elymus trachycaulus*. Weedy species such as *Cirsium arvense, Melilotus officinalis, Taraxacum officinale*, and *Poa secunda* are very common, especially in the presence of grazing (Jones and Walford 1995, Thilenius et al. 1995). *Maianthemum stellatum* is abundant only where grazing is absent.

In Montana, stands are typically heterogeneous in vegetation age and structure as well as microtopography, because of the small-scale patterns of alluvial deposition and erosion operating over the years. In Powder River County, cottonwood communities are represented by all seral stages, from seedlings up to trees greater than 18 inches circumference. The latter stands are widely spaced, with *Artemisia cana* establishment if the understory is intact. In the study area, *Symphoricarpos occidentalis* was typically present, but was there was not a distinct shrub-layer dominant. The dominant grass was *Pascopyrum smithii*, followed by *Nassella viridula*, and replaced by *Poa pratensis* under disturbance. Other characteristic species include *Rosa woodsii, Elymus canadensis* and such generalists as *Achillea millefolium*. There is widespread invasion by *Euphorbia esula*, which has become locally abundant in many stands. Tamegrasses have been seeded or accidentally introduced into some stands, including *Agropyron repens* and *Bromus inermis*.

Dynamics: This type is found closest to the river on young, unstabilized floodplains, where it colonizes the freshly deposited alluvial substrates on the meanders of the streams and rivers. Proceeding away from the river, other later successional stages may include *Populus deltoides / Fraxinus pennsylvanica* Forest (CEGL000658) and *Fraxinus pennsylvanica - (Ulmus americana) / Symphoricarpos occidentalis* Forest (CEGL002088). As the stream continues to move away from the more recent deposits, the stand may eventually succeed to the *Fraxinus pennsylvanica* type, a process that could take 100 years (Girard et al. 1989).

In Montana, the climate is too dry for succession to the *Fraxinus pennsylvanica* type. Decadent stands may succeed to *Artemisia cana* (Boggs 1984).

GRank & Reasons: G2G3 (98-06-22). The total number of occurrences is unknown. Thirteen have been documented in North Dakota, where the community is ranked S1S2?. Although no other occurrences have been documented, the community is also reported from Wyoming (S2), Colorado (S2) and may occur in South Dakota (SP). It is found in three northern Great Plains ecoregional sections. The community occurs on medium- to coarse-textured soils on the floodplains of major rivers.

Comments: Concept of the type may have come from Thilenius and Brown (1990). In eastern Montana, Hanson et al. (1990) describe a *Populus deltoides / Symphoricarpos occidentalis* type as a grazing-induced stage of the *Populus deltoides / Cornus sericea* type. This contrasts with information from Wyoming, where Thilenius et al. (1995) found that *Symphoricarpos occidentalis* decreases with grazing and *Chrysothamnus nauseosus* increases.

ELEMENT DISTRIBUTION

Range: This riparian woodland community is found in floodplains of the northwestern Great Plains of the United States, ranging from North Dakota to Colorado.

States/Provinces: CO:S2, MT:S2S3, ND:S1S2?, SD?, WY:S2

ELEMENT SOURCES

Authors: J. Drake, MCS: mod. B. L. Heidel, MTNHP Confidence: 1 Identifier: CEGL000660


Appendix E-12
III. SHRUBLAND

III.A.4.N.a. Lowland microphyllous evergreen shrubland

III.A.4.N.A.20. *ARTEMISIA TRIDENTATA* SSP. *WYOMINGENSIS* SHRUBLAND ALLIANCE

*ARTEMISIA TRIDENTATA* SSP. *WYOMINGENSIS / PASCOPYRUM SMITHII* SHRUBLAND

Wyoming Big Sagebrush / Western Wheatgrass Shrubland

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**ELEMENT CONCEPT**

**Summary:** This Wyoming big sagebrush type is found throughout the northern Great Plains and adjacent basins, Black Hills, and Rocky Mountains of the United States. Stands occur on gently rolling uplands or upper parts of stream terraces and drainageways. Drier examples may be on more exposed slope positions. Soils are moderately deep clays, clay loam, silt loam and loam. Soil moisture conditions are relatively mesic. Soil pH ranges from 5.8 to 7.8. The vegetation contains an open short-shrub layer, approximately 0.5 m tall, dominated by microphyllous-leaved shrubs, and a dense herbaceous layer dominated by medium-tall graminoids. Shrub cover averages between 15% and 30%. *Artemisia tridentata* ssp. *wyomingensis* dominates the shrub layer. The dense herbaceous layer has a canopy cover of over 75%. *Pascopyrum smithii* is the leading dominant. Important associates include *Koeleria macrantha*, *Poa secunda*, and *Nassella viridula (= Stipa viridula)*. In drier or more heavily grazed phases, *Bouteloua gracilis*, *Hesperostipa comata (= Stipa comata)*, and *Carex filiformis* may be more common, along with the succulent *Opuntia polyacantha*. Forbs contribute low cover, often less than 10%, and are typically of low constancy. More constant species (>50%) include *Artemisia frigida*, *Spheroceca coccinea*, and *Vicia americana*. Grassy leaf litter covers over 75% of the ground; stones and bare soil comprise the remainder. Nonvascular plants are rare.

**Environment:** Stands occur on gently rolling uplands or upper parts of stream terraces and drainageways. Drier examples may be on more exposed slope positions. Soils are moderately deep clays, clay loam, silt loam and loam. Soil moisture conditions are relatively mesic. Soil pH ranges from 5.8 to 7.8 (Hirsch 1985, Hansen and Hoffman 1988, Thilenius et al. 1995).

In Montana, this widespread plant association assumes many positions and patterns depending on environmental and perhaps historical context. It prevails across Bearpaw Shale in the Missouri River drainage (DeVelice et al. 1995, Jorgenson 1979, Heidel 1997) and Bearpaw shale of extreme southeastern Montana in Carter County (Vanderhorst et al. 1998). The pH of soils with this plant association in Carter County ranged from 4.9-8.0. It is present at some scale in all landscapes comprised of entisol-aridisol soil complexes. Over most of the shale plains in Powder River County, it is concentrated on the steeper slopes (greater than 8%) giving way to grassland on gentler slopes. This plant association is primarily east of the mountains, but is also documented on alluvial terraces of southwestern Montana (Cooper et al. 1995). Finally, it is found in small grassland panspots at the extreme eastern end of the state.

In Powder River County, this plant association is found in Thin Silty Ecological Sites, 10-14 in. precipitation zone. It is consistently found on steeper slopes throughout much of the County. It is not limited to steep slopes in all settings, and prevails at the extreme southwestern border of the county on Silty ecological sites, where elevation is higher. This is the case in the Ashland District of Custer National Forest, where soils supporting this plant association are characterized as loams and sandy loams (Hansen and Hoffman 1988) that seem to fall within the “Silty ecological site” definition.

**Vegetation:** The vegetation contains an open short-shrub layer, approximately 0.5 m tall, dominated by microphyllous-leaved shrubs, and a dense herbaceous layer dominated by medium-tall graminoids. Shrub cover averages between 15 and 30% (Hirsch 1985, Hansen and Hoffman 1988, Thilenius et al. 1995). *Artemisia tridentata* ssp. *wyomingensis* dominates the shrub layer. The dense herbaceous layer has a canopy cover of over 75%. *Pascopyrum smithii* is the leading dominant. Important associates include *Koeleria macrantha*, *Poa secunda*, and *Nassella viridula (= Stipa viridula)*. In drier or more heavily grazed phases, *Bouteloua gracilis*, *Hesperostipa comata (= Stipa comata)*, and *Carex filiformis* may be more common, along with the succulent...
Opuntia polyacantha. Forbs contribute low cover, often less than 10%, and are typically of low constancy. More constant species (>50%) include Artemisia frigida, Sphaeralcea coccinea, and Vicia americana. Grassy leaf litter covers over 75% of the ground; stones and bare soil comprise the remainder. Nonvascular plants are rare (Hirsch 1985, Hansen and Hoffman 1988, Thilenius et al. 1995).

In Powder River County, the cover of Pascopyrum smithii was high in pineland openings, up to 60% cover, while on the open plains was more typically less than 30% cover and codominant with Carex filifolia, Poa secunda, and/or Koeleria macrantha. Commonly associated species include Artemisia frigida, Achillea millefolium, Agoseris glauca, Allium textile, Antemaria porphyrospila, Commandra umbellata, Gutierrezia sarothrae, Opuntia polyacantha, Phlox hoodii, and Vicia americana. A particularly rich stand in the western end of the county included species that were scarce or absent elsewhere, including Calochortus nuttallii, Besseya wyomingensis, Linum lewisii, and Nassella viridula. Under heavy grazing pressure, the cover of exotic and increaser species like Bromus japonicus, Hedeoma hispida, Plantago patagonica, and Vulpia octoflora increases greatly.

**Dynamics:** Taylor and Holst (1976) refer to an “upland prairie sagebrush ecosystem” of the Ashland District and note that this sagebrush ecosystem overlaps strongly with upland grassland, appearing as an edaphic difference in places, and as a grazing disclimax in others. This dual nature of this sagebrush plant association was evident in the study area, with its status as an edaphic phenomenon indicated by the many areas in good condition. In southwestern Montana, this plant association may be a grazing disclimax (Cooper et al. 1995). See Cooper and Jean (2001) for a discussion of fire succession in the very similar Artemisia tridentata ssp. wyomingensis / Elymus lanceolatus association.

Artemisia tridentata ssp. wyomingensis is killed within prairie dog towns. In Powder River County, vegetation sampling was conducted on a bench along Buffalo Creek in what appeared to be a long-abandoned prairie dog, even though there were no signs of burrow mounds remaining. Elsewhere on the bench, Artemisia tridentata ssp. wyomingensis dominated in identical settings. In the abandoned prairie dog town, there was 50% cover of Pascopyrum smithii and 10% cover of both Poa secunda and Bromus japonicus, with high litter accumulation (greater than 60%). Perhaps the fertilizing and churning influence of the prairie dogs heightened productivity and impeded re-establishment of Artemisia tridentata ssp. wyomingensis in the high vegetation and/or high litter cover.

**GRank & Reasons:** G4 (94-02-23).

**High-ranked species:** The complex vegetation mosaic patterns of this plant association within grassland and sparsely vegetated outcrops lends habitat diversity that has high wildlife values for big game and upland bird species.

**Comments:** This plant association is often part of a continuous gradient with the Pascopyrum smithii - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation. The cover of Artemisia tridentata ssp. wyomingensis is also variable within stands, clustered around the cut-off point used in differentiating shrubland from shrub herbaceous vegetation, rather than centered greater or less than this point representing a cover value that can be discerned in remote sensing. Thus, the cover values used to define it are problematic.

Many of the same plant association classification questions associated with the Pascopyrum smithii - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation are also present for this plant association: 1) the interchangeability and ecological equivalence of Pascopyrum smithii and Elymus lanceolatus and the similar needlegrass species-pair has not been analyzed in detail. They sort by latitude in their distribution and their tendency to have different environmental modes where they occur together warrants extended documentation. We did note that Elymus lanceolatus is uncommon in Powder River County compared to Pascopyrum smithii; the former species is most common on overflow outwashes and panspots in the County. However, Elymus lanceolatus appeared to be the dominant or codominant in at least some of the Carter County vegetation study sites (Vanderhorst et al. 1998) and further investigation is needed into their ecological equivalency. 2) The question of delimiting the Pascopyrum smithii dominance from the Hesperostipa comata - Bouteloua gracilis dominance becomes secondary where Artemisia tridentata ssp. wyomingensis cover is high. The fine textured soils preclude much Hesperostipa comata in the study area. 3) There are different co-dominants with Pascopyrum smithii, with or without Bouteloua gracilis, Carex filifolia, Buchloe dactyloides, and Poa secunda. Given the current concept of this type, they all fit...
within the type, but not all of their environmental characteristics fit. The codominance of *Buchloe dactyloides* with *Pascopyrum smithii* in *Artemisia tridentata ssp. wyomingensis* shrubland, as documented on BLM-administered lands in much of Powder River County, has not been well-documented in the northern Great Plains.

**ELEMENT DISTRIBUTION**

**Range:** This Wyoming Big Sagebrush type is found throughout the northern Great Plains and adjacent basins, Black Hills, and Rocky Mountains of the United States, particularly in Colorado and Wyoming.

In Montana, it is most extensive on shale plains in counties along the Missouri River (DeVelice et al. 1995), as well as those of Carter County in the southeastern corner (Vanderhorst et al. 1998). But it is present throughout eastern Montana where there are fine-textured entisol and arisol soils, as found on Ashland and Sioux Districts of Custer National Forest (Hansen and Hoffman 1988). In Powder River County, this plant association is present everywhere the topography is dissected. It is especially extensive in the extreme southwestern corner of the county.

**States/Provinces:** CO:S3S4, MT:S?, ND?, WY:S?

**ELEMENT SOURCES**

**Authors:** D. Faber-Langendoen, WCS; mod. B. L. Heidel, MTNHP  
**Confidence:** 2  
**Identifier:** CEGL001047


**ARTEMISIA TRIDENTATA SPP. WYOMINGENSIS / PSEUDOROEGERIA SPICATA SHRUBLAND**

Wyoming Big Sagebrush / Bluebunch Wheatgrass Shrubland

**ELEMENT CONCEPT**

**Summary:** This is a widespread Wyoming Big Sagebrush shrub type, extending from the western side of the Great Plains on the east to British Columbia on the west, and south as far as northern Nevada. Stands of this type occupy loamy soils (often with coarse fragments) derived from a variety of parent materials, on middle and lower slopes and in draws. Shrubs are dense and form a canopy with at least 25% cover. *Artemisia tridentata ssp. wyomingensis* contributes the most cover to the shrub layer and is often the only shrub present. The height of the sagebrush ranges from about 35 cm tall in the eastern part of the range to about 1 m tall in the western part. *Chrysothamnus* spp. often are present as well. *Pseudoroegneria spicata* contributes more cover to the herbaceous layer than does any other native species, and *Poa secunda* usually is present. Stands in the eastern part of the geographic range often include *Gutierrezia sarothrae*, *Artemisia frigida*, *Bouteloua gracilis*, and *Koeleria macrantha*. Many stands of this community may result from grazing in stands of *Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001535). Grazing increases the cover and density of shrubs and often decreases the cover of grasses, especially of *Pseudoroegneria spicata*. Stands no doubt exist, though, that do not result from grazing. Such stands are likely found in draws and other places on the landscape where soil moisture is sufficient to support a dense shrub canopy, and may represent only a small area on the landscape.

**Environment:** Stands of this type occupy loamy soils (often with coarse fragments) derived from a variety of parent materials, on middle and lower slopes and in draws. The close relationship between this association and *Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001535) suggests that stands of this type occupy loamy soils (often with coarse fragments) derived from a variety of parent materials, on middle and lower slopes and in draws.

**Vegetation:** Throughout the geographic range of this type, *Artemisia tridentata ssp. wyomingensis* dominates a shrub layer that has at least 25% canopy cover. Rabbitbrushes (*Chrysothamnus* spp.) often are present as well. *Pseudoroegneria spicata* contributes more cover to the herbaceous layer than does any other native species, and *Poa secunda* usually is present. Stands in the eastern part of the geographic range often include *Gutierrezia*
sarothrae, Artemisia frigida, Bouteloua gracilis, and Koeleria macrantha. The height of the sagebrush ranges from about 35 cm tall in the eastern part of the range to about 1 m tall in the western part (Hironaka et al. 1983).

**GRank & Reasons:** G5? (96-02-01).

**Comments:** Many stands of this association may be derived by grazing of *Artemisia tridentata* ssp. wyomingensis / *Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001535). It may be preferable to first combine these two types, and then split them geographically. The occurrences from the Great Plains west as far as northwestern Colorado, western Wyoming, and western Montana might belong to one type characterized by the presence of *Bouteloua* spp., *Carex filifolia*, *Koeleria macrantha*, *Gutierrezia sarothrae*, *Artemisia frigida*, and *Opuntia polyacantha*, and by the absence of *Achnatherum thurberianum* (= *Stipa thurberiana*). The occurrences from southern Idaho, northern Nevada, eastern Oregon, eastern Washington, and British Columbia could belong to a different type characterized by the presence of *Achnatherum thurberianum*, and by the absence of the other species listed above. The separation between these two types probably would occur in Idaho. Additional research will be required to clarify this issue.

### ELEMENT DISTRIBUTION

**Range:** This is a widespread Wyoming Big Sagebrush shrub type, extending from the western side of the Great Plains on the east to British Columbia on the west, and south as far as northern Nevada.


**ELEMENT SOURCES**

**Authors:** B. Johnston, mod. D. Faber-Langendoen, WCS

**Confidence:** 2

**Identifier:** CEGL001009


### III.A.4.N.c. Temporarily flooded microphyllous shrubland

#### III.A.4.N.c.2. ARTEMISIA CANA TEMPORARILY FLOODED SHRUBLAND ALLIANCE

**ARTEMISIA CANA / PASCOPYRUM SMITHII SHRUBLAND**

**Silver Sagebrush / Western Wheatgrass Shrubland**

**ELEMENT CONCEPT**

**Summary:** This silver or coaltown sagebrush shrubland is found in the northwestern Great Plains and Rocky Mountains of the western United States. Stands occur on flat alluvial deposits on floodplains, terraces or benches, or alluvial fans. The soils are moderately deep to deep and either silt loam, clay loam, or sandy loam. Flooding may occur periodically and this tends to retard soil development. This community is dominated by a combination of shrubs and graminoids. The total vegetation cover is moderate. The tallest and most conspicuous stratum in this community is a shrub layer that is usually 0.6-1.2 m. *Artemisia cana* is the dominant in this layer and may be accompanied by *Symphoricarpos occidentalis*. Also present are shorter shrubs such as *Artemisia frigida, Krascheninnikovia lanata, Rosa woodsii,* and *Gutierrezia sarothrae*. The most abundant graminoid is *Pascopyrum smithii*. This species is typically 0.5-1.0 m tall. It is often accompanied by *Nassella viridula* and sometimes *Koeleria macrantha, Poa pratensis*, and *Hesperostipa comata* (= *Stipa comata*). *Bouteloua gracilis* is the most abundant short graminoid. Typical forb constituents of this community are *Achillea millefolium, Gaura coccinea, Sphaeralcea coccinea,* and *Lactuca tatarica* var. *pulchella*.

**Environment:** This community occurs on flat alluvial deposits on floodplains, terraces or benches, or alluvial fans. The soils are moderately deep to deep (USFS 1992) and either silt loam, clay loam, or sandy loam (Johnston 1987, Hansen and Hoffman 1988). The soils may have moderate salt content (Hanson and Whitman 1938). Flooding occurs periodically and this tends to retard soil profile development (Hirsch 1985).
In Powder River County, this plant association is found on Overflow Ecological Sites in the 10-15 and 15-19 inch precipitation zones. It is the prevailing vegetation along major river valleys.

**Vegetation:** This community is dominated by a combination of shrubs and graminoids. The total vegetation cover is typically moderate, but depends on frequency of flooding. The tallest and most conspicuous stratum is a shrub layer that is usually 0.6-1.2 m (Hansen and Hoffman 1988). In 14 stands in western North Dakota shrubs averaged 28% canopy cover, graminoids 59%, and forbs 2% (USFS 1992). Stands in Nebraska often have less than 15% cover. The variation in soils within and between stands of this community results in variable species composition. *Artemisia cana* is the dominant shrub. *Symphoricarpos occidentalis* is frequently present. There are also shorter shrubs such as *Artemisia frigida*, *Krascheninnikovia lanata*, *Rosa woodsii*, and *Gutierrezia sarothrae*. The most abundant graminoid is *Pascopyrum smithii*. This species is typically 0.5-1.0 m tall. It is often accompanied by *Nassella viridula* and sometimes *Koeleria macrantha*, *Poa pratensis*, and *Hesperostipa comata* (= *Stipa comata*). *Bouteloua gracilis* is the most abundant short graminoid. Typical forb constituents of this community are *Achillea millefolium*, *Gaura coccinea*, *Sphaeralcea coccinea*, and *Lactuca tatarica var. pulchella*.

**Dynamics:** Periodic flooding occurs in many stands of this community.

**Rank & Reasons:** G4 (96-02-01).

**Comments:** See Steinauer and Rolfsmeyer (2000) for a description of the stands in Nebraska.

**ELEMENT DISTRIBUTION**

**Range:** This silver or coaltown sagebrush shrubland is found in the northwestern Great Plains and Rocky Mountains of the western United States, ranging from Montana and North Dakota, south to Nebraska.

**States/Provinces:** MT: S4, ND: S2S3?, NE: S7, SD: SU

**ELEMENT SOURCES**

**Authors:** Drake, J. F., WCS; mod. B. L. Heidel, MTNHP  
**Confidence:** 1  
**Identifier:** CEGL001072


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

III.B.2.N.d.6. *SALIX (EXIGUA, INTERIOR) TEMPORARILY FLOODED SHRUBLAND ALLIANCE*

**ELEMENT CONCEPT**

**Summary:** This willow shrubland community is found along rivers and streams at lower elevations throughout the northwestern United States and Great Plains. This type is an early successional stage that occurs on recently flooded riparian areas. Stands occur most commonly on alluvial sand, but silt, clay, or gravel may also be present. *Salix exigua* is the dominant canopy species (*Salix interior* or intermediates of the two willow species may be present in the eastern part of the range). It can form dense stands up to 4 m tall, but there are often patches where the shrub layer is absent. Seedlings and small saplings of *Populus deltoides* and *Salix amygdaloides* may be present. The herbaceous cover is sparse to moderate, but rarely exceeds 30%. Species present include *Cenchrus longispinus*, *Polygonum lapathi folium*, *Schoenoplectus americanus* (= *Scirpus americanus*), *Triglochin maritima*, and *Xanthium strumarium*. The composition of this community, especially the herbaceous layer, varies from year to year with succession or renewed disturbance.

**Environment:** This community is found on recently deposited or disturbed alluvial material. The parent material is alluvial sand, although silt, clay, or gravel may be present. Soil development is poor to absent.
Vegetation: This community is dominated by shrubs, generally between 2 and 4 m tall. The most common of these is *Salix exigua* (*Salix interior* or intermediates of the two willow species may be present in the eastern part of the range). *Salix irrorata* and saplings of *Populus deltoides* or *Salix amygdaloides* are also frequently found in the shrub layer. This stratum can have moderate to high stem density in the community as a whole. The species in the shrub layer do not form a closed canopy, allowing significant light to reach the ground layer. There are often patches where the shrub layer is absent. The herbaceous cover is sparse to moderate, but rarely exceeds 30%. Older stands and places with less competition from the shrubs have greater herbaceous cover. The composition of the herbaceous layer can vary greatly. Species that are often found in this community are *Cenchrus longispinus*, *Polygonum lapathifolium*, *Schonoplectus americanus* ( = *Scirpus americanus*), *Triglochin maritima*, and *Xanthium strumarium*.

Dynamics: This type originates after flash floods that create new deposits or scour existing alluvial material. This community is a primary or early secondary community and requires floods to create new areas on which it can develop. Once established, this community may not exist for more than 10-20 years before it is replaced by a later seral stage.

GRank & Reasons: G5 (99-05-06)

Comments: This type may be an early successional shrubland that develops into *Salix exigua* / Mesic Graminoids Shrubland (CEGL001203), or the two types may be essentially synonymous. This plant association occupies a wide geographic range. The range of this type was reviewed and it was split into eastern, *Salix interior* Temporarily Flooded Shrubland (CEGL008562), and western components. The western stands may all be composed of *Salix exigua* (*sensu stricto*) and Great Plains stands may contain either *Salix exigua*, *Salix interior*, or intermediates of the two willow species, the *Salix exigua* being an entirely Great Plains and eastwardly distributed species (Kartesz 1999).

ELEMENT DISTRIBUTION

Range: This sandbar willow shrubland community is found along rivers and streams at lower elevations throughout the northwestern United States and Great Plains, ranging sporadically from Oklahoma northwest to the Dakotas and Manitoba, and west to Washington. Part of this type’s former range in the Great Plains and eastward is actually occupied, at least in part, by *Salix interior* [see *Salix interior* Temporarily Flooded Shrubland (CEGL008562)].


ELEMENT SOURCES

Authors: J.F. Drake, WCS
Confidence: 1
Identifier: CEGL001197

III.B.2.N.d.20. SYMPHORICARPUS OCCIDENTALIS TEMPORARILY FLOODED SHRUBLAND ALLIANCE

**SYMPHORICARPUS OCCIDENTALIS SHRUBLAND**

Western Snowberry Shrubland

**ELEMENT CONCEPT**

Summary: This western snowberry shrubland is found in the western tallgrass and northern Great Plains of the United States and Canada. Stands occur in mesic depressions and swales, typically surrounded by upland grassland communities. The soils are silts and loams. This type has three distinct vegetation layers, a shrub layer (approximately 80 cm tall), a graminoid-dominated layer (approximately 30 cm tall), and a forb-dominated layer (<20 cm tall). *Symphoricarpus occidentalis* is the predominant species in the shrub layer and at times forms almost monospecific stands. *Rosa woodsii* commonly occurs interspersed with the *Symphoricarpus occidentalis*. Other shrubs, such as *Rhus aromatica* and *Prunus virginiana*, often occur as thickets on the fringe of this

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community. *Rhus aromatica* and *Prunus virginiana* can reach 2 m or more. The herbaceous layer is poorly represented where the shrubs are dense, although *Poa pratensis* occurs in many stands. Common forbs include *Artemisia ludoviciana*, *Solidago* spp., and *Achillea millefolium*. Vines, such as *Parthenocissus vitacea*, are often found climbing through the shrubs. This type is frequently observed in heavily grazed meadows and prairies.

**Environment:** This community is found in mesic swales, depressions, ravines and floodplains. Some examples of this community experience intermittent and brief flooding. The soils are fertile and well-drained to imperfectly drained silts and loams. The upper soil horizon is usually deep, although a thin layer of sand may be present if the site has been recently flooded (Jones and Walford 1995).

**Vegetation:** Throughout its range this community is dominated by shrubs approximately 1 m tall. Shrub cover is typically greater than 50%, and in places it can approach 100%. These shrubs form dense clumps that exclude most other species. *Symphoricarpus occidentalis* is the most common shrub, but *Rhus aromatica* (or *Rhus trilobata*) and *Prunus virginiana* can be locally abundant and can grow to 2-3 m in places. *Toxicodendron rydbergii* may also be present. Herbaceous species and smaller shrubs are most abundant at the edges of this community and in gaps between the clumps of taller shrubs where the shading is less complete. *Rosa woodsii* is a typical smaller shrub. Common graminoids include *Pascopyrum smithii* and *Poa pratensis*. *Achillea millefolium*, *Artemisia ludoviciana*, *Galium boreale*, and *Solidago* spp. are common forbs of this community. Woody vines sometimes occur, including *Parthenocissus vitacea*.

**Dynamics:** Stands may occasionally be flooded (Jones and Walford 1995). *Symphoricarpus occidentalis* seems to thrive in disturbed areas (Hansen and Hoffman 1988), especially those subject to disturbance by fire and cattle grazing.

**GRank & Reasons:** G4G5 (96-02-01). This type is common throughout the northern Great Plains. Historically, it may never have been very extensive. It has been observed to grow out from forest or woodland edges and shade out the grasses. It is tolerant of both grazing and fire (Hansen and Hoffman 1988), and is under no threat from human activities. In some cases, heavily grazed pastures may favor this types. Many examples are somewhat weedy; thus the type is not demonstrably secure.

**Comments:** This type often occurs in heavily disturbed areas in conjunction with exotic species such as *Poa pratensis* and *Cirsium arvense*. Because it occurs in mesic swales, depressions, ravine bottoms and floodplains, some stands are occasionally flooded whereas others are just very moist. Thus it tends to fall on both sides of the upland/wetland division.

**ELEMENT DISTRIBUTION**

**Range:** This western snowberry shrubland is found in the western tallgrass and northern Great Plains of the United States and Canada.

**States/Provinces:** CO:S3, IA?, MB?, MT:S4S5, ND:S4?, NE:S4, SD:SU, SK:S?, WY:SR

**ELEMENT SOURCES**

**Authors:** Drake, J. F., WCS  **Confidence:** 3  **Identifier:** CEGL001131

III.B.3.N.a. Extremely xeromorphic deciduous subdesert shrubland without succulents

III.B.3.N.A.14. SARCObATUS VERMICULATUS SHRUBLAND ALLIANCE

SARCObATUS VERMICULATUS / PSEUDOROEGNERIA spICATA SHRUBLAND
Black Greasewood / Bluebunch Wheatgrass Shrubland

ELEMENT CONCEPT

Summary: This greasewood community is found in the badlands regions of the northwestern Great Plains. Stands are found on weakly consolidated sedimentary rocks, where eroded slopes contain interbedded clay and silt shales. Slopes range from 0-80%, and average about 35-40%, with a southwest- to southeast-facing aspect. A thin crust of highly saline salt 1-5 cm in depth may form on the surface. Soil pH is around 8.0. Stands have a sparse to moderate woody layer (15-40% cover) dominated by the deciduous, facultative halophytic shrub Sarcobatus vermiculatus. Other characteristic shrubs and dwarf-shrubs may include Artemisia tridentata, Atriplex canescens, Ericameria nauseosa (= Chrysothamnus nauseosus), and Gutierrezia sarothrae. The herbaceous layer ranges from absent to moderately sparse cover (<25%) of scattered tall and medium-tall bunch grasses, such as Pseudoroegneria spicata, Achnatherum hymenoides (= Oryzopsis hymenoides), and the sod grass Bouteloua gracilis. Annual grasses, especially the exotic Bromus tectorum and Bromus japonicus, may be present. Forbs are sparse, except on disturbed, weedy sites. Forb species may include Eriogonum pasciflorum, Suaeda calceoliformis, or Sphaeralcea coccinea. Occasionally, cacti, such as Opuntia fragilis or Opuntia polyacantha, may also be present.

Environment: Stands occur in the badlands regions of the northwestern Great Plains, where they are found on weakly consolidated sedimentary rocks. The badland topography is composed of outcrops of parallel beds of clay and silt shales, interspersed in some regions with lignite (coal) seams of varying thickness, massive outcroppings of sandstone strata, and colluvial talus of clay, silt and fragments of sandstone (Brown 1971). This community is found on the interbedded clay and silt shales. Slopes range from 0 to 80%, and average about 35-40%, with a southwest- to southeast-facing aspect. On steeper slopes, this community is found on residual interbedded clays and silts, with occasional bands of lignite that are from several centimeters to over a meter in thickness, and stands are usually 0.5 ha in size. On more gentle slopes, they are found on alluvial materials of stream terraces and may range in size up to 4 ha or more. A thin crust of highly saline salt 1 to 5 cm in depth may form on the surface. These crusts form in places where substantial movement of subsurface water accumulates high concentrations of salts and sodium near the surface through high evaporation rates (Brown 1971). The porous lignite seams may cause subsurface water to move horizontally to the surface on the hillsides (Hansen and Hoffman 1988). The upper and lower soil horizons contain concentrations of sodium salt of 9.1 to 12.0 me/100 g (Brown 1971). Soil pH is around 8.0.

Vegetation: Stands have a sparse to moderate woody layer (15-40% cover) dominated by the deciduous, facultative halophytic shrub Sarcobatus vermiculatus. Other characteristic shrubs and dwarf-shrubs may include Artemisia tridentata, Atriplex canescens, Ericameria nauseosa (= Chrysothamnus nauseosus), and Gutierrezia sarothrae. The herbaceous layer ranges from absent to moderately sparse cover (<25%) of scattered tall and medium-tall bunch grasses, such as Pseudoroegneria spicata, Achnatherum hymenoides (= Oryzopsis hymenoides), and the sod grass Bouteloua gracilis. Annual grasses, especially the exotic Bromus tectorum and Bromus japonicus may be present. Forbs are sparse, except on disturbed, weedy sites. Forb species may include Eriogonum pasciflorum, Suaeda calceoliformis, or Sphaeralcea coccinea. Occasionally, cacti, such as Opuntia fragilis or Opuntia polyacantha, may also be present (Brown 1971, Hansen and Hoffman 1988).

Dynamics: Natural disturbances include ongoing erosion of badlands topography, and, where stands are near streams, occasional flash floods.

GRank & Reasons: G3 (99-09-28). This type is restricted to Badlands topography in the northern Great Plains, rarely exceeding 4-5 ha in size. Sites are not particularly threatened, but site requirements are very specialized (highly salty subsurface soils) and localized.

Appendix E-20
ELEMENT DISTRIBUTION

Range: This community is found in the badlands regions of southeastern Montana and western South Dakota, and possibly in northeastern Wyoming and western North Dakota.

States/Provinces: MT:S3, ND:S?, SD:S?, WY?

ELEMENT SOURCES


Appendix E-21
V. HERBACEOUS VEGETATION

V.A.5.N.a. Tall sod temperate grassland
V.A.5.N.a.3. ANDROPOGON HALLII HERBACEOUS ALLIANCE

**Sand Bluestem - Prairie Sandreed Herbaceous Vegetation**

**Element Concept**

**Summary:** This sand prairie community is found in the northern and central Great Plains of the United States and Canada. Stands are found on sandy deposits, usually on gentle to moderate slopes, ranging from stabilized rolling to choppy sand dunes. The soil is sand, loamy sand, or sandy loam, often erodible, and somewhat poorly developed. This community is dominated by moderately widely spaced mid to tall grasses. The most abundant species are *Andropogon hallii* and *Calamovilfa longifolia*. Other graminoids that may be found in this community include *Bouteloua gracilis*, *Bouteloua hirsuta*, *Carex duriuscula*, *Carex filifolia*, *Carex inops* ssp. *heliophila*, *Cyperus schweinitzii*, *Eragrostis trichodes*, *Hesperostipa comata* (= *Stipa comata*), *Koeleria macrantha*, *Muhlenbergia pungens*, *Redfieldia flexuosa*, and *Schizachyrium scoparium*. Forbs and shrubs are a minor component of the total vegetation. Characteristic forbs include *Chenopodium subglaucum*, *Chamaesyce serpyllifolia*, *Helianthus pauciflorus*, *Helianthus petiolaris*, *Lappula occidentalis* var. *occidentalis*, *Liatris punctata*, *Lithospermum incisum*, *Lygodesmia juncea*, *Monarda punctata*, *Oenothera rhombipetala*, *Pennisetum glaucum* (in Nebraska), and *Psoralidium lanceolatum*. Other common shrubs, especially on wind-blown dune crests and choppy slopes in Nebraska sandhills, include *Artemisia frigida* and *Yucca glauca*.

In Montana, this plant association is uncommon as a widely-scattered feature associated with active wind erosion. Montana in general does not have the choppy dune systems that characterize the Nebraska Sandhills and the glacial lake sandhills elsewhere in the northern Great Plains, where they are more extensive and well-developed. This plant association is at the "rim" of blowouts within the most similar of Montana landscapes, i.e., the Medicine Lake sandhills of Sheridan County. But, this type is so small and narrow a vegetation band that it was not included in the description of plant associations here. There is more habitat for it in the unglaciated sedimetary plains of the Fort Union Formation at localized erosion features associated with sandstone outcrops, though widely-scattered and in small pockets. In Powder River County, this plant association is uncommon in places with sandstone outcrops as found in at least the eastern end of the County.

**Environment:** This community is usually found on sandy deposits, such as dunes, with gentle to moderate slopes (Johnston 1987). The soil is sand, loamy sand, or sandy loam and often erodible. Hirsch (1985) reported that stands of this type in southwestern North Dakota were small, generally less than 0.05 ha.

In Montana and Powder River County, this plant association is restricted to active wind erosion features in the Sands ecological sites, most often in the sideslopes of a blowout but also at the rim. It occurs in Powder River County within the 10-14 in ppt. zone, and at higher precipitation levels elsewhere.

**Vegetation:** This community is dominated by moderately widely spaced mid to tall grasses. The most abundant species are *Andropogon hallii* and *Calamovilfa longifolia*. Other graminoids that may be found in this community include *Bouteloua gracilis*, *Bouteloua hirsuta*, *Carex duriuscula* (= *Carex eleocharis*), *Carex filifolia*, *Carex inops* ssp. *heliophila*, *Cyperus schweinitzii*, *Eragrostis trichodes*, *Hesperostipa comata* (= *Stipa comata*), *Koeleria macrantha*, *Muhlenbergia pungens*, *Redfieldia flexuosa*, and *Schizachyrium scoparium*. Forbs and shrubs are a minor component of the total vegetation. Characteristic forbs include *Chenopodium subglaucum*, *Chamaesyce serpyllifolia* (= *Euphorbia serpyllifolia*), *Helianthus pauciflorus*, *Helianthus petiolaris*, *Lappula occidentalis* var. *occidentalis*, *Liatris punctata*, *Lithospermum incisum*, *Lygodesmia juncea*, *Monarda punctata*, *Oenothera rhombipetala*, *Pennisetum glaucum* (in Nebraska), and *Psoralidium lanceolatum*. *Artemisia frigida* and *Yucca glauca* are the most common shrubs, especially on wind-blown dune crests and choppy slopes in Nebraska.
sandhills (Steinauer and Rolfsmeier 2000). On eroding parts of the Nebraska Sandhills a number of different species may occur, including Chamisa geyeri, Chamisa missurica, Chenopodium berlandieri, Chenopodium pratericola, Cycloloma atriplicifolium, Erigeron bellidiastrem, Eriogonum annuum, Froelichia floridana var. campestris, Ipomopsis longiflora, and Linum rigidum. Redfieldia flexuosa is common in blowouts (Steinauer and Rolfsmeier 2000). In southeastern North Dakota, a subtype containing tallgrass species may be distinct; species include Andropogon gerardii, Symphyotrichum ericoides (= Aster ericoides), Lithospermum canescens, Solidago nemoralis, and Sporobolus heterolepis (Burgess 1965). In southwestern Kansas, Calamovilfa gigantea may be present (Lauver et al. 1999).

In Montana, the vegetation is dominated or co-dominated by Andropogon hallii and Calamovilfa longifolia. Sometimes they sort in separate small bands by microhabitat and succession, but they are more often intermixed. Other graminoids that are often present include Achnatherum hymenoides, Sporobolus cryptandrus and Hesperostipa comata. Forbs typically include Ambrosia psilostachya, Eriogonum annuum, Helianthus petiolaris, Lygodesmia juncea, Psoralidium lanceolatum, and Tractescantia occidentalis.

**Dynamics:** Blowouts may occur in this community type, leading to bare soils or subsoils. Blowouts may be related to severe droughts and windstorms, and may occur in conjunction with grazing pressures or fires that reduce the ability of the vegetation cover to stabilize the sand. Andropogon hallii - Carex inops ssp. heliophila Herbaceous Vegetation (CEGL001466) may be an early successional phase on blowouts, at least in the northern states (Burgess 1965). Blowouts may subsequently develop into this type where sands have been stabilized and vegetation cover and diversity are high.

**G Rank & Reasons:** G4G5 (00-03-24). This type has a relatively restricted distribution in terms of site characteristics, but has a wide distribution in the northern Great Plains. The community is reported from 7 ecoregional sections in Kansas, Nebraska, Montana, South Dakota, North Dakota, Manitoba, and Saskatchewan. Stands are typically less than a few hectares in size in the northern parts of the range, but can be quite extensive in the Nebraska Sandhills. Total coverage is over 100,000 acres. Threats are not known.

**High-ranked species:** This plant association or closely related ones harbor many S1 and S2 plant species in Montana, including Chenopodium subglabrum, Cryptantha fendleri, Cyperus schweinitzii, Dalea villosa var villosa, Mentzelia nuda, Psoralea lanceolata, and possibly others.

**Comments:** Stands in this association may vary from north to south and east to west. More northern stands may have higher dominance by Carex filifolia or Carex inops ssp. heliophila. Distinctions between this type and Andropogon hallii - Carex inops ssp. heliophila Herbaceous Vegetation (CEGL001466) are not entirely clear. Note that Looman (1980) describes this type for Manitoba, but these northern stands also contain Carex siccata (= Carex foenea), Dianthus spicata, and Festuca ovina. Currently the North Dakota Heritage Program restricts this type primarily to the tallgrass prairie region of the state, where sands are deep, as described in part by Burgess (1965); however, it is reported farther west in southwestern North Dakota (Hirsch 1985) and Montana. Range-wide application of this type needs further review. In Minnesota, relatively small Calamovilfa longifolia-dominated patches can occur in dry sand prairies or barrens, particularly on crests of dunes, but these are treated as part of Schizachyrium scoparium - Hesperostipa spartea - Bouteloua (curtipendula, gracilis) Sand Herbaceous Vegetation (CEGL005204). Andropogon hallii does not occur as a native species in Minnesota. Steve Kettler (pers. comm. 1998) indicated that this association does not occur in Colorado (although they once tracked it). All of their sandhill types contain Artemisia filifolia and are classified (or will be reclassified) as Artemisia filifolia / Andropogon hallii Shrubland (CEGL001459). NRCS range site descriptions state that abundance of Artemisia filifolia should be low, but Kettler thinks it is always present, otherwise the vegetation and environment are similar. He suggested that the presence or absence of Artemisia filifolia seems to make a good split between the southern (Colorado and south and east) and the northern (Nebraska and north) sandhills.

**Element Distribution**

**Range:** This sand prairie community is found in the northern and central Great Plains of the United States and Canada, ranging from Manitoba and Saskatchewan, south to Kansas.

In Montana, it is localized within the aeolian sand deposits of the Medicine Lake Sandhills. There exists appropriate habitat in the unglaciated sedimentary plains at localized erosion features associated with sandstone.

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outcrops, though widely-scattered and in small pockets.

**States/Provinces:** KS:S2S3, MB:S?, MT:S?, ND:S?, NE:S5, SD:S?, SK:S?

<table>
<thead>
<tr>
<th>ELEMENT SOURCES</th>
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<tbody>
<tr>
<td><strong>Authors:</strong> Drake, J. F., WCS; mod. B. L. Heidel, MTNHP</td>
</tr>
<tr>
<td><strong>Confidence:</strong> 1</td>
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**ANDROPOGON HALLII - CAREX INOPS SSP. HELIOPHILA HERBACEOUS VEGETATION**

Sand Bluestem - Sun Sedge Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This sand bluestem prairie community type is found in restricted areas of the northern Great Plains of the United States. Stands occur on gently to steeply sloping terrain with sand or sandy loam soil. In Montana, stands occur on slopes of any aspect, but north is the least likely. In North Dakota, they occur on steep, choppy sands. The vegetation is very open, ranging from 15-50% cover. The taller herbaceous stratum of this community is dominated by Andropogon hallii, with associates of Calamovilfa longifolia, Hesperostipa comata (= Stipa comata), and Sporobolus cryptandrus. In southeastern North Dakota Koeleria macrantha, Redfieldia flexuosa, and Hesperostipa spartea (= Stipa spartae) are present at low abundance. The lower herbaceous stratum is dominated by Carex spp., especially Carex inops ssp. heliophila. Other species that may be present are Artemisia frigida, Carex filifolia, Carex duriuscula, Dalea villosa, and Yucca glauca. Key diagnostic characteristics include the choppy sand dune habitat, the very open structure of the vegetation, dominance by Andropogon hallii with Carex inops ssp. heliophila and the presence of early successional species, such as Redfieldia flexuosa.

**Environment:** This type is found on gentle to steep sloping terrain with sand or sandy loam soil. In Montana, it can occur on slopes of any aspect but north is the least likely (MTNHP 1988). In North Dakota, it occurs on steep, choppy sands (Heidel 1984).

**Vegetation:** The vegetation is very open, ranging from 15-50% cover (Burgess 1965). The taller herbaceous stratum of this community is dominated by Andropogon hallii, with associates of Calamovilfa longifolia, Hesperostipa comata (= Stipa comata), and Sporobolus cryptandrus. In southeastern North Dakota Koeleria macrantha, Redfieldia flexuosa, and Hesperostipa spartea (= Stipa spartae) are present at low abundance, and Carex inops ssp. heliophila is not present (Burgess 1965, Nelson et al. 1981). The lower herbaceous stratum is dominated by Carex spp., especially Carex inops ssp. heliophila. Other species that may be present are Artemisia frigida, Carex filifolia, Carex duriuscula (= Carex eleocharis), Dalea villosa (= Petalostemon villosus), and Yucca glauca.

**Dynamics:** Blowouts may occur in this community type, leading to bare soils or subsoils. Blowouts may be caused by severe droughts and windstorms, and may occur in conjunction with grazing pressures that reduce the ability of the vegetation cover to stabilize the sand. This type may be an early successional stage on these blowouts where vegetation cover and diversity are low. It may develop into Calamovilfa longifolia - Andropogon hallii Herbaceous Vegetation (CEGL001469) (Burgess 1965).

**GRank & Reasons:** G3 (96-02-01). This type has a very restricted distribution both geographically, and in terms of site characteristics. Stands are only known from southeastern Montana and southeastern North Dakota, where they are typically less than a hectare in size. A recent rapid ecological assessment of the Northern Great Plains did not turn up any sites for this type, substantiating its restricted nature (Martin et al. 1998). Threats are not known.

**Comments:** This association occurs only in limited places. Range-wide review is still needed, e.g., distinctions between it and Andropogon hallii - Calamovilfa longifolia Herbaceous Vegetation (CEGL001467) are not entirely clear. Andropogon hallii occurs in Manitoba, but stands are placed in the Andropogon hallii - Calamovilfa longifolia Herbaceous Vegetation (CEGL001467) [see Looman 1980]. Stands in southeastern North Dakota may contain more tallgrass prairie associates, such as Andropogon gerardii, Symphyotrichum ericoides (= Aster...
ericoides), Lithospermum canescens, Solidago nemoralis, and Sporobolus heterolepis, than those in Montana.

The name of this association should probably be changed to *Calamovilfa longifolia - Carex inops ssp. heliophila - Carex filifolia* Herbaceous Vegetation. *Carex filifolia* occurs on a wider variety of substrates than does *Carex inops ssp. heliophila*, which is more restricted to lighter sands. Steve Cooper (pers. comm. 1998) also notes that *Carex filifolia* occurs farther north and west in Montana than does *Carex inops ssp. heliophila*. In Montana, *Carex inops ssp. heliophila* also occurs on shales that have been weathered to sand particles. In North Dakota, this type is restricted to the western part of the state.

**ELEMENT DISTRIBUTION**

**Range:** This sand bluestem prairie community type is found in restricted areas of the northern Great Plains of the United States, including southeastern Montana and southeastern North Dakota.

**States/Provinces:** MT:S3, ND:S7

**ELEMENT SOURCES**

**Authors:** J. Drake, WCS  
**Confidence:** 1  
**Identifier:** CEGL001466


**V.A.5.N.A.11. CALAMOVILFA LONGIFOLIA HERBACEOUS ALLIANCE**

**CALAMOVILFA LONGIFOLIA - CAREX INOPS SPP. HELIOPHILA HERBACEOUS VEGETATION**  
Prairie Sandreed - Sun Sedge Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This prairie sandreed grassland is found in the northwestern Great Plains of the United States and Canada. Stands typically occur on gentle slopes but can also be found on flat land or moderate to steep slopes. Soils are thin sands, sandy loams, and loamy sands, in places derived from sandstone. Moisture levels may be high deeper in the soil profile. Most stands of this community are not very large. The vegetation is dominated by graminoids, with two strata, one of mid to tall grasses, the other of dense short sedges. Shrubs are uncommon. In the taller grass layer, the most abundant species is *Calamovilfa longifolia*. Other species found in this layer include *Koeleria macrantha, Schizachyrium scoparium*, and *Hesperostipa comata (= Stipa comata)*. *Pascopyrum smithii* may be present on some stands with finer soil textures. The short graminoid layer is composed chiefly of *Carex filifolia* and *Carex inops ssp. heliophila*, which may have high cover values. Other upland Carices, such as *Carex duriuscula*, as well as *Bouteloua gracilis* and *Muhlenbergia pungens*, may also be present. Forb species diversity is moderate but they do not contribute greatly to the cover. The forbs that are typical of this community include *Artemisia dracunculus, Artemisia frigida, Artemisia ludoviciana, Chenopodium album, Chenopodium leptophyllum, Lathyrus spp., Liatris puncata, Lygodesmia juncea, Phlox hoodii*, and *Psoralidium lanceolatum*.

**Environment:** Stands are found on gently rolling uplands with little to moderate slopes (typically between 0 and 20%, but occasionally as high as 39%) (Hirsch 1985, Hansen and Hoffman 1988). The soils are sand, sandy loam, or loamy sand and there is rarely substantial soil horizon development (Hanson and Whitman 1938). The parent material is sandstone (USFS 1992). Moisture levels may be high deep in the profile.

In Powder River County, this plant association is found within the Sandy Ecological Sites of the 10-14 and 15-19 inch precipitation zones.

**Vegetation:** The vegetation structure is somewhat open, with cover averaging 65% in parts of its range (USFS 1992). The vegetation is dominated by graminoids, with two strata, one of mid to tall grasses, the other of dense short sedges. In the taller grass layer, the most abundant species is *Calamovilfa longifolia*. Other species found in this layer include *Koeleria macrantha, Schizachyrium scoparium*, and *Hesperostipa comata (= Stipa comata)*. *Pascopyrum smithii* may be present on some stands with finer soil textures. The short-graminoid layer is composed chiefly of *Carex filifolia* and *Carex inops ssp. heliophila*, which may have high cover values. Other upland Carices, such as *Carex duriuscula (= Carex eleocharis)*, as well as *Bouteloua gracilis* and *Muhlenbergia...
pungens, may also be present. Forb species diversity is moderate, but they do not contribute greatly to the cover (Hanson and Whitman 1938, USFS 1992). The forbs that are typical of this community include Artemisia dracunculus, Artemisia frigida (considered a shrub by some authors), Chenopodium leptophyllum, Lathyrus spp., Liatris punctata, Lygodesmia juncea, Phlox hoodii, and Psoralidium lanceolatum. Shrubs are uncommon. When shrubs are present they are short shrubs such as Yucca glauca, Rosa spp., and Artemisia frigida (considered a forb by some authors).

**GRank & Reasons:** G3 (96-02-01). No occurrences have been documented, but the community is reported in 3 ecoregional subsections in Wyoming, Montana, North Dakota, South Dakota, and Saskatchewan. It is a very uncommon community in Badlands National Park, South Dakota.

**Comments:** The name of this association should probably be changed to *Calamovilfa longifolia - Carex inops ssp. heliophila - Carex filifolia* Herbaceous Vegetation. *Carex filifolia* occurs on a wider variety of substrates than does *Carex inops ssp. heliophila*, which is more restricted to lighter sands. Steve Cooper (pers. comm. 1998) also notes that *Carex filifolia* occurs farther north and west in Montana than does *Carex inops ssp. heliophila*. In Montana, *Carex inops ssp. heliophila* also occurs on slopes that have been weathered to sand particles. In North Dakota, this type is restricted to the western part of the state.

**ELEMENT DISTRIBUTION**

**Range:** This prairie sandreed grassland is found in the northwestern Great Plains of the United States and Canada, ranging from the western Dakotas to Montana and Saskatchewan.

**States/Provinces:** MT:S3?, ND:SU, SD:S?, SK:S?

**ELEMENT SOURCES**

**Authors:** K. Hirsch, mod. J. Drake and D. Faber-Langendoen, WCS; mod. B. L. Heidel, MTNHP

**Confidence:** 2

**Identifier:** CEGL001471


**CALAMOVILFA LONGIFOLIA - HESPEROSTIPA COMATA HERBACEOUS VEGETATION**

Prairie Sandreed - Needle-and-Thread Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This prairie sandreed grassland community type occurs in the central and northern Great Plains region of the United States. Stands occur on stabilized sand dunes, as well as in interdunal valleys, colluvial sands, and, less commonly, silty terraces of intermittent streams. Soils are medium to fine sands formed either from eolian or colluvial processes. The vegetation has an open canopy, dominated by mid to tall grasses. *Calamovilfa longifolia* and *Hesperostipa comata* (= *Stipa comata*) are the most conspicuous and dominant grasses. Other common grasses include *Bouteloua gracilis*, *Koeleria macrantha*, *Achnatherum hymenoides* (= *Oryzopsis hymenoides*), *Sporobolus cryptandrus*. The type may grade into stands dominated by *Pascopyrum smithii* and *Nassella viridula* (= *Stipa viridula*) at the base of slopes. *Andropogon hallii* or *Hesperostipa spartea* (= *Stipa spartea*) may also be present. Sedges are rare, but could include *Carex inops ssp. heliophila*. Forb diversity ranges from low to moderate, depending on the site. Dry valley sand prairies may be particularly forb-rich. Silty terraces of intermittent streams may contain *Artemisia frigida*, *Artemisia ludoviciana*, *Gutierrezia sarothrae*, *Psoralidium tenuiflorum*, and *Yucca glauca*. Shrubs are scattered and infrequent to absent, with *Rhus triloba* the most common shrub. These areas are highly susceptible to invasion by exotic brome grasses (*Bromus japonicus*, *Bromus squarrosus*, *Bromus tectorum*) and may be quite weedy.

**Environment:** Stands occur on stabilized sand dunes, as well as in interdunal valleys or draws, colluvial sands, and, less commonly, silty terraces of intermittent streams. Soils are medium to fine sands formed either from eolian or colluvial processes. For example, in Nebraska stands occur below sandstone outcrops and escarpments. More rarely, stands occur on floodplain terraces of intermittent streams, where soils are moderately deep, poorly drained, silty loams and loams (Heerwagen 1958, USDA 1979, Barnes et al. 1984, Steinauer and Rolfsmeier 2000).
In Powder River County, this plant association is found in the Sandy Ecological Sites of the 10-14 inch precipitation zone.

Vegetation: The vegetation has an open canopy, dominated by mid to tall grasses. *Calamovilfa longifolia* is the most conspicuous grass. Other common grasses include *Bouteloua gracilis*, *Bouteloua gracilis*, *Koeleeria macrantha*, *Achnatherum hymenoides* (= *Oryzopsis hymenoides*), *Sporobolus cryptandrus*, and *Hesperostipa comata* (= *Stipa comata*). *Pascopyrum smithii* (= *Agropyron smithii*) and *Nassella viridula* (= *Stipa viridula*) may occur on more level sites at the base of slopes (Barnes et al. 1984, Steinauer and Rolfsmeier 2000). *Andropogon hallii* may also be present. Sedges are rare but could include *Carex inops* ssp. *heliophila*. Forb diversity ranges from low to moderate, depending on the site. Dry valley sand prairies may be particularly forb-rich. Silty terraces of intermittent streams may contain *Artemisia frigida*, *Artemisia ludoviciana*, *Gutierrezia sarothrae*, *Psoralidium tenuiflorum*, and *Yucca glauca* (Steinauer and Rolfsmeier 2000). Shrubs are scattered and infrequent to absent, with *Rhus trilobata* the most common species. These areas are highly susceptible to invasion by exotic brome grasses (*Bromus japonicus*, *Bromus squarrosus*, *Bromus tectorum*) and may be quite weedy (Heerwagen 1958, USDI 1979, Steinauer and Rolfsmeier 2000).

Dynamics: Blowouts caused by drought and wind may occur in this type. The type probably represents a later successional stage. Earlier stages may be dominated by *Andropogon hallii* (e.g., *Andropogon hallii - Calamovilfa longifolia* Herbaceous Vegetation (CEGL001467)). Heavy grazing may increase the likelihood of blowouts.

GRank & Reasons: G3 (96-02-01). The community is reported in 2 ecoregional sections in Wyoming, Colorado, and Nebraska. It is restricted primarily to stabilized sand dunes, as well as in interdunal valleys or draws, colluvial sands, and intermittent streams, but it has a moderately wide distribution in the central to northern Great Plains. Stands are typically less than a few hectares in size, but larger stands are found in interdunal valleys in Nebraska, some reaching 100 acres or more (G. Steinauer pers. comm. 1999). In Nebraska, this community can be heavily grazed and subsequently invaded by exotic species (Steinauer and Rolfsmeier 2000).

Comments: This type may perhaps be differentiated from other types, such as *Calamovilfa longifolia - Carex inops* ssp. *heliophila* Herbaceous Vegetation (CEGL001471), by the absence or low abundance of *Carex filifolia* and *Carex inops* ssp. *heliophila*, though why those species are not abundant in this type is not clear. Further floristic comparisons need to be made to help make the distinction clear between that type and this type. Some floristic variability is to be expected in this type, based on successional patterns following dune blowouts. Steve Kettler (pers. comm. 1998) says they don't have this type in Colorado. It sounds like a version of a locally described *Andropogon hallii - Hesperostipa comata* type, of which Colorado is also not very confident. Kettler suspects that a lot of the variation in grass dominance is from different management (grazing) over the years. The silty terrace stands are reported from the White River drainage in northwestern Nebraska and Badlands National Park, South Dakota (Von Loh et al. 1999, Steinauer and Rolfsmeier 2000).

ELEMENT DISTRIBUTION

Range: This prairie sandreed grassland community type occurs in the central and northern Great Plains region of the United States, ranging from Colorado and Nebraska, north to Wyoming and South Dakota.

This type has been documented in Powder River County, Montana.

States/Provinces: AB?, CO?, MT:S3, NE:S?, SD:S?, WY:S3

ELEMENT SOURCES

Authors: G. Steinauer and S. Rolfsmeier, mod. D. Faber-Langendoen, WCS; mod. B. L. Heidel, MTNHP
Confidence: 2 Identifier: CEGL001473

Appendix E-27
V.A.5.N.c. Medium-tall sod temperate or subpolar grassland
V.A.5.N.c.29. HESPEROSTIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

**HESPEROSTIPA COMATA - BOUTELOUA GRACILIS - CAREX FILIFOLIA HERBACEOUS VEGETATION**

Needle-and-Thread - Blue Grama - Threadleaf Sedge Herbaceous Vegetation

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**Element Concept**

**Summary:** This needlegrass - grama grass prairie community is common in the northern and central Great Plains of the United States. Stands occur on flat to rolling topography with deep (40-100 cm), sandy loam to loam, coarser-textured soils. They are typically associated with uplands, though they may also occur lower in the landscape, such as coulee and draw bottoms, if soils are sufficiently coarse (usually sandstone-derived). The type is found at elevations ranging from 600-1700 m (2000-5500 feet); average annual precipitation associated with these elevation param ranges from slightly less than 25 cm to over 50 cm (10-20 inches). The vegetation is dominated by moderate to moderately dense medium-tall grasses. *Hesperostipa comata (= Stipa comata)* is the tallest of the dominant species, sending seed heads to a maximum height of approximately 1 m. The rhizomatous graminoids *Bouteloua gracilis* and *Carex filifolia*, the other two dominant/codominant species, do not usually exceed 0.5 m. *Calamovilfa longifolia* is often found with high cover values on sandier soils, and *Koeleria macrantha* cover increases on degraded sites. There are regionalized expressions of variability with *Carex inops* ssp. *heliophila* surpassing *Carex filifolia* in Colorado and *Calamagrostis montanensis* being at least as important as the diagnostic species in north-central Montana. *Pascoopyrum smithii* is consistently present. For woody species, subshrub forms (*Artemisia frigida*, *Gutierrezia sarothrae*, *Rosa arksansa*) have the highest cover and constancy, but their total cover does not sum to more than 5%, except on overgrazed sites. Cover values for forbs are low (the exception being *Selaginella densa*). Geographic setting influences forb composition to some degree, with *Sphaeralcea coccinea*, *Phlox hoodii*, *Heterotheca villosa*, *Gaura coccinea*, and *Liatris punctata* common in the northern areas, and *Lygodesmia juncea*, *Opuntia polyacantha*, *Artemisia dracunculus*, and *Ratibida columnifera* seeming to increase to the eastern and southern areas.

**Environment:** Stands occur on flat to rolling topography with deep (40-100 cm) sandy loam to loam soils. They are typically associated with uplands, though they may also occur lower in the landscape, such as coulee and draw bottoms, if soils are sufficiently coarse (usually sandstone derived). Even though it is a major association in the Northern Plains, it does not occur in areas dominated exclusively by shale and mudstone parent materials, from which heavy soils are derived. This type is found at elevations ranging from 600 to 1700 m (2000-5500 feet); average annual precipitation associated with these elevation parameters ranges from slightly less than 25 cm to over 50 cm (10 to 20 inches).

**Vegetation:** The vegetation is dominated by moderately dense graminoids that are usually between 0.5 and 1 m tall. For example, on 19 stands in west-central Montana the cover by the different strata was as follows: shrubs 6%, graminoids 67%, forbs 11%, bryophytes 14%, litter 55%, rock 4%, bare soil 9% (Mueggler and Stewart 1978). Thilenius et al. (1995) found that the average cover on 14 stands in eastern Wyoming was 42%. *Hesperostipa comata* (= *Stipa comata*) is the tallest of the dominant species, sending seed heads to a maximum height of approximately 1 m. The rhizomatous graminoids *Bouteloua gracilis* and *Carex filifolia*, the other two dominant/codominant species, do not usually exceed 0.5 m. *Calamovilfa longifolia* is often found with high cover values on sandier soils and *Koeleria macrantha* cover increases on degraded sites. There are regionalized expressions of variability with *Carex inops* ssp. *heliophila* surpassing *Carex filifolia* in Colorado and *Calamagrostis montanensis* being at least as important as the diagnostic species in north-central Montana. *Pascoopyrum smithii* is consistently present. For woody species, subshrub forms (*Artemisia frigida*, *Gutierrezia sarothrae*, *Rosa arksansa*) have the highest cover and constancy but their total cover does exceed more than 5%, except on overgrazed sites. Cover values for forbs are low throughout the range of the type (the exception being *Selaginella densa*). Geographic setting does influence forb composition to some degree. *Sphaeralcea coccinea*, *Phlox hoodii*, *Heterotheca villosa*, *Gaura coccinea*, and *Liatris punctata*, have high constancy values in northern areas, whereas in the eastern and southern portions of the range *Lygodesmia juncea*, *Opuntia polyacantha*, *Artemisia dracunculus* and *Ratibida columnifera* seems to be more constant.
Dynamics: Vast (singly and in the aggregate) prairie dog (Cynomys ludovicianus) "towns" once developed on the favorable substrates of this type and exploited its vegetation. Prairie dog populations have undergone a precipitous decline since settlement, so much of this type could be in various states of secondary succession, returning from a somewhat denuded state and altered composition created by the prairie dogs (and attendant bison that found nutritious forage here). Fire, both aboriginal- and lightening-caused, was a regular part of this landscape. Fire-return intervals have been considerably lengthened since settlement by European-Americans. This association and Pascopyrum smithii - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation (CEGL001579) could be considered the most common plant associations in the Northern Great Plains (Martin et al. 1998). These two associations, cited by many authors as the climatic climax communities for this region, are manifested by matrix or large patch occurrences frequently found dominating whole landscapes. The Hesperostipa comata (= Stipa comata) defined community is more associated with uplands and the Pascopyrum smithii defined type characterizes sites with higher moisture status, generally occurring at lower positions in the landscape.

GRank & Reasons: G5 (99-02-25). This is an exceedingly common type, manifesting any number of permutations, some of which are related to disturbance and some of which appear to be related to the expected geographic distinctions in such a broadly distributed type. The only reason to consider it a G4 is that it has received, and continues to receive, significant grazing pressure which, combined with the surge in alien weed populations, pose a significant threat to its quality.

Comments: Carex filifolia is lacking or highly reduced in importance southward. Southern stands were once classified separately (CEGL001699), and further review of their characteristics compared to more northern stands is needed. Weaver and Albertson (1956) also remark on the fact that low sedges are present as far south as Texas but are important only north of Colorado. However, a phase of the Hesperostipa comata - Bouteloua gracilis type of Mueggler and Stewart (1980) in western Montana is apparently quite similar to communities of the southern and southeastern portions or the Northern Great Plains, and both lack Carex filifolia. There are a welter of named community types, mostly seral representations of grazing or fire impacts, that vary by having one or another of the defining species (or even other graminoids, e.g., Carex inops ssp. heliophila) dominant. This assemblage of types is also defined by having relatively low cover of both Pascopyrum smithii and Elymus lanceolatus (= Agropyron dasystachyum). To accommodate these permutations within the concept of the type (as lesser-ranked occurrences) or to recognize them as independent vegetation types recognized by existing vegetation composition is one question. Another is, what cover value or degree of dominance of Pascopyrum smithii or Elymus lanceolatus will serve to establish the distinction between Pascopyrum smithii - Hesperostipa comata - Carex filifolia (and allied Pascopyrum smithii-"dominated" communities) from the community under consideration.

ELEMENT DISTRIBUTION

Range: This needlegrass - grama grass prairie community is common in the northern and central Great Plains of the United States and Canada, ranging from Manitoba west to Alberta, south to Kansas and possibly Colorado.


ELEMENT SOURCES

Authors: J. Drake, MCS; mod. B. L. Heidel, MTNHP  
Confidence: 1 Identifier: CEGL002037


HESPEROSTIPA COMATA - CAREX FILIFOLIA HERBACEOUS VEGETATION

Needle-and-Thread - Threadleaf Sedge Herbaceous Vegetation

ELEMENT CONCEPT

Environment:  
In Powder River County, MT this plant association occurs on sandy, nearly-level uplands scattered along the Powder River and on top of isolated, sandstone-capped buttes and ridges.

Vegetation:  
GRank & Reasons: G4 (96-02-01).
Comments: In Montana this plant association appears to correspond with a subset of environmental conditions for the *Hesperostipa comata* - *Bouteloua gracilis* - *Carex filifolia* plant association.

**ELEMENT DISTRIBUTION**

Range: In Montana, this plant association is reported from the Sioux District of Custer National Forest as well as national grasslands in South Dakota (Hansen and Hoffman 1988).

States/Provinces: MT:S4

**ELEMENT SOURCES**

Authors: WCS; mod. B. L. Heidel, MTNHP  
Confidence: 2  
Identifier: CEGL001700


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**V.A.5.N.C.27. PASCOPYRUM SMITHII HERBACEOUS ALLIANCE**

**PASCOPYRUM SMITHII - BOUTELOUA GRACILIS - CAREX FILIFOLIA  HERBACEOUS VEGETATION**

Western Wheatgrass - Blue Grama - Threadleaf Sedge Herbaceous Vegetation

**ELEMENT CONCEPT**

Summary: This western wheatgrass prairie community occurs throughout much of the northwestern Great Plains of the United States and Canada, on flat or gently sloping terrain. Many stands are on floodplains or gentle valley slopes. Some are on uplands. The soils are clay loam, silt loam, or loam and usually deep and fertile. This community is dominated by medium and short graminoids. The midgrass stratum is dominated by *Pascopyrum smithii* or *Elymus lanceolatus*. Common associates include *Koeleria macrantha*, *Hesperostipa comata* (= *Stipa comata*), and *Nassella viridula*. *Hesperostipa comata* is more common on the upper slopes and drier upland sites with sandier soils, whereas *Nassella viridula* is more common on the lower slopes and floodplains with finer-textured soils. The most common short graminoid is *Bouteloua gracilis*. Other common graminoids include *Carex filifolia*, *Carex inops* ssp. *heliophila*, *Carex duriaausca* (= *Carex eleocharis*), and *Carex pensylvanica*. Forbs do not contribute much of the canopy cover but they are scattered throughout this community. Typical forbs are *Tragopogon dubius*, *Gaura coccinea*, *Hedeoma hispida*, *Phlox hoodii* and *Sphaeralcea coccinea*.

In Montana, this association occurs as a prevalent plant association across eastern plains landscapes and at all smaller scales on fine-textured soils. It has *Pascopyrum smithii* composing a significant portion of the canopy cover, representing mid-height stature and rhizomatous growth form, unless suppressed under drought cycles. Short stature graminoids (grasses and sedges) compose equal or greater cover than the canopy of mid-height grasses.

Environment: This community is found on flat or gently sloping terrain. Many stands are on floodplains or gentle valley slopes, others are on uplands. Surface layers of soils are usually clay loams, although stands of this type may also be found on loams, silt loams, silty clays and clays (Hansen and Whitman 1938, Hansen and Hoffman 1988). In Alberta and Saskatchewan this association grows on solonetzic soils (with an eluvial horizon above a dense clay horizon high in sodium salts) developed on thin glacial till over Cretaceous shale (Coupland 1961). This community does not appear to be found in mountain valleys (Hanson and Dahl 1956, Jones 1992).

In Montana, this community occurs on deep-soil settings of the plains on loams, silt loams, and clay loams, with or without impeded drainage. It spans the full range of topographic positions in its current vegetation definition, while sorting by topographic position and permeability depending on species dominance phase. This association and the *Hesperostipa comata* - *Bouteloua gracilis* - *Carex filifolia* Association (CEGL002037) could be considered the most common plant associations in the Northern Great Plains (Martin et al. 1998). These two associations, cited by many authors as the climatic climax communities for this region, are manifested by matrix or large patch occurrences frequently found dominating whole landscapes. The *Hesperostipa comata* defined community is more associated with uplands and the *Pascopyrum smithii* defined type characterizes sites with higher moisture status, generally occurring at lower positions in the landscape.

Appendix E-30
In Powder River County, the association occurs on gentle slopes ranging from 0-35% and it is characteristic of the widespread Silty Ecological Site of the 10-14 inch precipitation zone. It is prevalent on gentler slopes within the Elso-Midway-Thurlow and the Elso-Remmit-Ocean Lake soil associations derived from calcareous shales. It also occurs on Silty Ecological Sites on well-drained deep-loam soils of the Elso - Ocean Lake association to the north. It is occasional on upland and bench positions with suitable substrate in the Ringling-Cabba-Midway association to the west, a Clayey Ecological Site of the 15-19 inch precipitation zone.

**Vegetation:** This community is dominated by medium and short graminoids. Total vegetation cover is usually high (Hanson and Dahl 1956, Hansen et al. 1984). *Pascopyrum smithii* or *Elymus lanceolatus* or both (the two species are similar both morphologically and ecologically) and *Bouteloua gracilis* usually contribute the most cover; however, *Bouteloua gracilis* cover may vary from codominant to locally absent. *Carex filifolia, Carex duriuscula (= Carex eleocharis),* and *Carex pensylvanica* are often secondary species, but they also vary from moderate cover to locally absent. *Hesperostipa comata (= Stipa comata)* usually is present as a secondary species, but it often codominates on sandy loam soils. In Alberta and Saskatchewan, *Hesperostipa curvata (= Stipa spartea var. curvata)* may be as common as *Hesperostipa comata.* *Koeleeria macrantha* is present in most stands and may contribute substantial cover. The forbs most likely to be found in this association are *Phlox hoodii,* *Sphaeralcea coccinea, Polygonum ramosissimum,* *Plantago patagonica, Opuntia polyacantha,* *Artemisia frigida,* *Antennaria microphylia,* and *Hedeoma hirsuta.* In southeastern Montana, western North Dakota, and northeastern Wyoming, stands of this association often contain *Artemisia tridentata* ssp. *wyomingensis.* Exotic brome grasses, especially *Bromus commutatus* and *Bromus tectorum,* are present in many stands of this association and they commonly contribute substantial cover (Hanson and Dahl 1956, Coupland 1961, Hansen et al. 1984, Hansen and Hoffman 1988).

In Montana, this association occurs as a prevalent plant association across eastern plains landscapes and at all smaller scales on fine-textured soils. It has *Pascopyrum smithii* composing a significant portion of the canopy cover, representing mid-height stature and rhizomatous growth form, unless suppressed under drought cycles. Short stature graminoids (grasses and sedges) compose equal or greater cover than the canopy of mid-height grasses.

We note that in Powder River County, all combinations of species as co-dominants have been documented. *Buchloe dactyloides* is also a recurring co-dominant to add to the plant association description. In places co-dominated by *Pascopyrum smithii* and *Buchloe dactyloides,* the cover of grasses was high under good range conditions (greater than 70%) and the cover of forbs was low, often including one or more of the following: *Agoseris glauca,* *Hedeoma hispida,* *Lomatium foeniculaceum,* *Linum austrole,* *Psoralea argophylla,* and *Sphaeralcea coccinea.* Under degraded range conditions, the cover of annual bromes, *Vulpia octoflora* and *Poa secunda* increased, and the cover of *Pascopyrum smithii* decreased. Forb cover was significant only under degraded conditions, with such non-native or increaser species as *Alyssum desertorum,* *Camelina sativa,* *Opuntia polyacantha* and *Plantago eriopoda.* In the course of this study, we took ten plots and extensive field notes, with particular emphasis on documenting the vegetation co-dominated by *Pascopyrum smithii* and *Buchloe dactyloides* that was extensive on BLM lands.

**Dynamics:** In the past, fire likely occurred commonly in this type. Vast ( singly and in the aggregate) prairie dog ( *Cynomys ludovicianus*) "towns" once developed on the favorable substrates of this type and exploited its vegetation. Prairie dog populations have undergone a precipitous decline since settlement, so much of this type could be in various states of secondary succession, returning from a somewhat denuded state and altered composition created by the prairie dogs (and attendant bison that found nutritious forage here). Fire, both aboriginal- and lightening-caused, was a regular part of this landscape. Fire-return intervals have been considerably lengthened since settlement by European-Americans.

**G Rank & Reasons:** G4 (96-02-01). The G4 rank is based on the broad geographic range of this type, and its status as a common vegetation type within that range. Heavy grazing and lack of fire throughout its range may cause many stands to have a high proportion of exotics.

**High-ranked species:** Check for correlation with black-tailed prairie dog towns in the area.
Comments: Almost any combination of Pascopyrum smithii, Bouteloua gracilis, Carex filifolia, and Hesperostipa comata (= Stipa comata) can be found in the northern and northwestern Great Plains, and the relative amounts of these species apparently depend at least in part on soil texture and grazing history. Moreover, drought or wet weather can cause the relative amounts of these species in one stand to change markedly in a few years (Ellison and Woolfolk 1937, Weaver and Albertson 1956). Consequently, differentiating between plant associations based solely on the relative amounts of these species is extremely difficult. This Pascopyrum smithii - Bouteloua gracilis - Carex filifolia association is found on soils in textural classes finer than loam in which Pascopyrum smithii and/or Elymus lanceolatus (which is similar morphologically and ecologically) contribute at least as much cover as does Hesperostipa comata. Bouteloua gracilis, Elymus lanceolatus and Carex filifolia may be patchily distributed, so areas of several acres should be examined to determine whether the vegetation belongs to this association. This association shares major graminoid species with Hesperostipa comata - Bouteloua gracilis - Carex filifolia Herbaceous Vegetation (CEGL002037) but in the latter association, Hesperostipa comata contributes more cover than do Pascopyrum smithii or Elymus lanceolatus, and the latter association grows on soils of loam or coarser texture.

Recognition of this plant association in Montana is complicated by four factors. 1) There is a basic question on delimiting the Pascopyrum smithii Alliance as separate from the Hesperostipa comata - Bouteloua gracilis Alliance and possibly others. The classification work to date has amassed information from the literature that includes different standards of measure (basal cover vs. canopy cover) as well as different climate cycles. Classification within the “wheatgrass-needlegrass” domain of Kuchler (1964) may result in different dominance types depending on whether defined by canopy dominance or basal dominance. 2) The interchangeability and ecological equivalence of Pascopyrum smithii and Elymus lanceolatus and the similar needlegrass species-pair has not been analyzed in detail. They sort by latitude in their distribution and their tendency to have different environmental modes where they occur together warrants extended documentation. Note: Elymus lanceolatus is uncommon in Powder River County compared to Pascopyrum smithii. It is most common on overflow outwash and panspots. 3) There are many different expressions of the plant association that have been well-documented. In one of its most widespread forms, Hesperostipa comata is associated with Pascopyrum smithii and Bouteloua gracilis. In the Ashland District of Custer National Forest, Pascopyrum smithii is associated with Carex filifolia (Hansen and Hoffman 1988). In broad, hot alluvial flats, there are reports of Pascopyrum smithii occurring repeatedly with Bouteloua gracilis (Heidel et al. 2000). Given the current concept of this type, they all fit within the type, but not all of their environmental characteristics fit. 4) The codominance of Buchloe dactyloides with Pascopyrum smithii, as documented on BLM-administered lands in much of Powder River County, has not been well-documented in the northern Great Plains. Vegetation dominated by Pascopyrum smithii, Buchloe dactyloides and Bouteloua gracilis was briefly described in the South Dakota Badlands (Tolstead 1941), and mapped accordingly by Kuchler (1964). It is widely accepted that heavy grazing favors increased cover of Buchloe dactyloides, as demonstrated on clay range sites at the Fort Keogh Livestock and Range Experiment Station of the northern Great Plains (Reed and Peterson 1961), as well as in the central and southern Great Plains.

In Powder River County, the two species are ubiquitous on silty range sites. The cover values of Pascopyrum smithii typically ranged from 20-30%, but in moisture-collcting settings and successional conditions, may exceed 50%. The cover of Buchloe dactyloides were typically around 60%. It superficially resembled blue grama (Bouteloua gracilis), from which it differs in vegetative reproduction by stolons, dioecious spikelets, and leaf surface characteristics. The latter was not present above a trace in plots with this association. The cover of individual native forb species was only a trace.

In Powder River County, we documented co-dominance of Pascopyrum smithii and Buchloe dactyloides as prevalent on eastern plains. Co-dominance of Pascopyrum smithii and Carex filifolia has been documented on ridge systems to the west (Hansen and Hoffman 1988) and we documented co-dominance of Pascopyrum smithii, Hesperostipa comata and Bouteloua gracilis with changes in substrate to the north.

ELEMENT DISTRIBUTION

Range: This western wheatgrass prairie community occurs throughout much of the northwestern Great Plains of the United States and Canada on flat or gently sloping terrain, ranging from Alberta and Saskatchewan in Canada south to Nebraska and possibly Colorado.

In Powder River County, there are extensive areas of fine-textured soils where this is the prevalent plains plant

Appendix E-32
association.

**States/Provinces:** AB:S?, CO?, MT:S4, ND:S3?, NE:S3S4, SD:S4, SK:S?, WY?

**ELEMENT SOURCES**

**Authors:** H.C. Hanson and W. Whitman, mod. J. Drake and D. Faber-Langendoen, WCS; mod. B. L. Heidel, MTNHP **Confidence:** 2 **Identifier:** CEGL001579


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**PASCOPYRUM SMITHII HERBACEOUS VEGETATION**

Western Wheatgrass Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This midgrass prairie type is found in the northern and western Great Plains, Rocky Mountains, and the interior western United States and possibly Canada. Stands occur on level to gently sloping terrain. They are found on alluvial fans, swales, river terraces, floodplains, valley floors and basins. The soils are clay, clay loam, and silt loam. *Pascopyrum smithii* strongly dominates the moderate to dense (40-100% cover) mixedgrass herbaceous canopy that grows 0.5-1 m tall. Other graminoids that co-occur and may achieve local dominance are *Koeleria macrantha*, *Eleocharis palustris*, and *Poa* spp. Many other species common in midgrass prairies are also found in this community. These include *Artemisia ludoviciana*, *Eriogonum* spp., *Bouteloua gracilis*, *Nassella viridula*, and *Hesperostipa comata* (= *Stipa comata*). Shrubs and dwarf-shrubs are rare in this community, but occasional woody plants such as *Artemisia tridentata*, *Symphoricarpos* spp., *Ericameria nauseosa*, or *Krascheninnikovia lanata* may be present. Introduced species, such as *Bromus tectorum*, *Bromus inermis*, *Poa pratensis*, *Melilotus* spp. or *Cirsium arvense*, are common in some stands, especially where disturbed.

**Environment:** This grassland association is widespread in the northern and western Great Plains, Rocky Mountains, the intermountain western United States and possibly Canada. Elevation ranges from 600-3000. Stands occur on level to gently sloping terrain. They are found on alluvial fans, swales, river terraces, floodplains, valley bottoms and basins. The soils are deep (40-100 cm) and well-developed with clay, clay loam, and silt loam textures. Some stands occur on perched water tables.

**Vegetation:** This association is characterized by a moderate to dense (40-100% cover) mixedgrass herbaceous canopy that grows 0.5-1 m tall and is strongly dominated by *Pascopyrum smithii*. Other graminoids that co-occur and may achieve local dominance are *Koeleria macrantha*, *Eleocharis palustris*, and *Poa* spp. Many other species common in midgrass prairies are also found in this community. These include *Artemisia frigida*, *Artemisia ludoviciana*, *Achillea* sp., *Carex* spp., *Eriogonum* spp., *Bouteloua gracilis*, *Nassella viridula*, and *Hesperostipa comata* (= *Stipa comata*). Shrubs and dwarf-shrubs are rare in this community, but occasional woody plants such as *Symphoricarpos* spp., *Ericameria nauseosa*, or *Krascheninnikovia lanata* may be present. Introduced species, such as *Bromus tectorum*, *Bromus inermis*, *Poa pratensis*, *Melilotus* spp., *Cirsium arvense*, *Taraxacum officinale*, or *Salsola kali*, are common in some stands, especially where disturbed.

**Dynamics:** In semi-arid climates, this association is found in relatively mesic topographic positions such as swales, river terraces, floodplains and basins that may be temporarily or intermittently flooded or in some classes, the fine textured soil sometimes perches the water table (Hansen et al. 1995, Hansen and Hall 1997). In more mesic climates it is found in extensive upland areas.

**GRank & Reasons:** G3G5Q (96-02-01).

**Comments:** This community is similar to several others that are dominated or codominated by *Pascopyrum smithii*. As currently defined, it represents a western Great Plains and foothills version of the western wheatgrass types in the central Great Plains. Further work needs to be done to refine the differences in composition and environmental characteristics. See recent descriptions by Thilenius et al. (1995) *(Pascopyrum smithii)* sodgrass.
steppe, a more playa-like wheatgrass type) and by Steinauer and Rolfsmeier (2000). In Nebraska, Steinauer and Rolfsmeier (2000) suggest that their stands may resemble *Pascopyrum smithii* - *Nassella viridula* Herbaceous Vegetation (CEGL001583).

### Element Distribution

**Range:** This midgrass prairie type is found in the northern and western Great Plains, Rocky Mountains, intermountain western United States and possibly Canada, ranging from North Dakota and possibly Saskatchewan, south to Nebraska and Colorado, west to northern Arizona, Utah and Idaho.

**States/Provinces:** AZ:S?, CO:S1?, ID:S IQ, MT:S4, NE:S?, SD:S?, SK:S ?, UT:S3S5, WY:S4Q

### Element Sources

**Authors:** J.F. Drake, mod. K. Schulz, WCS

**Confidence:** 3

**Identifier:** CEGL001577


### V.A.5.N.c.20. Schizachyrium scoparium - Bouteloua curtipendula Herbaceous Alliance

**Schizachyrium scoparium - Bouteloua (curtipendula, gracilis) - Carex filifolia**

#### Herbaceous Vegetation

**Summary:** This little blue stem - mixedgrass prairie type is distributed throughout the northern Great Plains of the United States and Canada. Stands are usually found on moderate to steep slopes with variable aspects. The soils are typically shallow and occur over sandstone or limestone. The vegetation is predominantly composed of graminoid species less than 1 m tall with moderate to high cover. The dominant species is *Schizachyrium scoparium* with *Bouteloua curtipendula*, *Bouteloua gracilis*, and *Carex filifolia* as associates or codominants. *Andropogon gerardii*, *Carex inopsp. heliophila*, *Carex duriuscula*, *Koeleria macrantha*, and *Calamovilfa longifolia* are often present. *Calamovilfa longifolia* may be abundant on sandier soils. *Muhlenbergia cuspidata*, *Hesperostipa comata* (= *Stipa comata*), *Pascopyrum smithii*, and *Nassella viridula* may also be present. Forbs do not contribute greatly to the canopy, but many species may be found in this community. Among the forbs that may be found are *Echinacea angustifolia*, *Symphyotrichum oblongifolium* (= *Aster oblongifolius*), *Gaura coccinea*, *Lygodascia juncea*, *Helianthus pauciflorus* sp. *pauciflorus*, *Rosa arkansana*, *Liatris punctata*, *Pediothelum argophyllum*, *Symphyotrichum ericoides* (= *Aster ericoides*), *Dalea purpurea*, and *Campanula rotundifolia*.

**Environment:** This community is usually found on gentle to steep slopes with variable aspects (Hansen et al. 1984, Johnston 1987, Hansen and Hoffman 1988). The soil may be loamy sand, sandy loam, loam, or clay loam. There may be a substantial component of gravel. Hansen et al. (1984) found 7-36% gravel by weight in 16 stands in western North Dakota. The soils are typically shallow and occur over sandstone or limestone (Johnston 1987, Thilenius et al. 1995).

**Vegetation:** This community is predominantly composed of graminoid species less than 1 m tall. *Pinus ponderosa* may occasionally be present. The vegetation cover is moderate to high. Thilenius et al. (1995) found that vegetation cover was 44% in Wyoming, and Hansen and Hoffman (1988) found 75% cover in North Dakota. The dominant species is *Schizachyrium scoparium*, with *Bouteloua curtipendula*, *Bouteloua gracilis*, and *Carex filifolia* as associates or codominants. *Andropogon gerardii*, *Carex inopsp. heliophila*, *Carex duriuscula* (= *Carex eleocharis*), *Koeleria macrantha* and *Calamovilfa longifolia* are often present. *Calamovilfa longifolia* may be abundant on sandier soils. *Muhlenbergia cuspidata*, *Hesperostipa comata* (= *Stipa comata*), *Pascopyrum smithii*, and *Nassella viridula* may also be present. *Pseudoroegneria spicata* may be found in the western portions of this community (Jones 1992). In Manitoba, the graminoids *Festuca ovina* and *Elymus trachycaulus* and the
lichen Selaginella densa are more abundant (Greenall 1995). Forbs do not contribute greatly to the canopy, but many species may be found in this community (Hanson and Whitman 1938). Among the forbs that may be found are Echinacea angustifolia, Symphyotrichum oblongifolium (= Aster oblongifolius), Symphyotrichum ericoides (= Aster ericoides), Gaura coccinea, Lygodemia juncea, Helianthus pauciflorus ssp. pauciflorus, Rosa arkansana, Liatris punctata, Pediomelum argophyllum (= Psoralea argophylla), Dalea purpurea, Phlox hoodii, and Campanula rotundifolia. There are very few woody species; those that are present are usually short shrubs such as Artemisia frigida, Juniperus horizontalis, and Yucca glauca. Litter often accumulates and may cover more than 50% of the ground (Hirsch 1985).

Dynamics: Fire probably played a major role in this type, whereby periodic fires would increase graminoid production and deter tree growth.

GRank & Reasons: G3G4 (99-09-09).

Comments: Contrast this association with Schizachyrium scoparium - Bouteloua curtipendula grasslands in New Mexico. Hansen et al. (1984) report that Bouteloua gracilis and Koeleria macrantha (= Koeleria cristata) may be prominent in Theodore Roosevelt National Park, North Dakota.

ELEMENT DISTRIBUTION
Range: This little bluestem mixedgrass prairie type is distributed throughout the northern Great Plains of the United States and Canada, ranging from Manitoba and possibly Saskatchewan, south to South Dakota and Wyoming.


ELEMENT SOURCES
Authors: P.L. Hansen, G.R. Hoffman, and A.J. Bjugstad, mod. J. Drake and D. Faber-Langendoen, WCS; mod. B. L. Heidel, MTNHP Confidence: 2 Identifier: CEGL001681

V.A.5.N.c.35. SCHIZACHYRIUM SCOPARIUM HERBACEOUS ALLIANCE

SCHIZACHYRIUM SCOPARIUM - CAREX INOPS SPP. HELIOPHILA HERBACEOUS VEGETATION
Little Bluestem - Sun Sedge Herbaceous Vegetation

ELEMENT CONCEPT
Summary:
Environment: In Powder River County, this plant association is found in Sandy Ecological Sites, 10-14 inch precipitation zone.
Vegetation:
Dynamics:
GRank & Reasons: G3 (96-02-01).
Comments:

Range:
States/Provinces: MT:S3

ELEMENT DISTRIBUTION

ELEMENT SOURCES
Authors: WCS; mod. B. L. Heidel, MTNHP Confidence: 2 Identifier: CEGL001682
References: Bourgeron and Engelking 1994, Culwell and Scow 1982, Driscoll et al. 1984
V.A.5.N.d. Medium-tall bunch temperate or subpolar grassland
V.A.5.N.d.8. FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE

**FESTUCA IDAHOENSIS - CAREX INOPS SPP. HELIOPHILA HERBACEOUS VEGETATION**
Idaho Fescue - Sun Sedge Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** Festuca idahoensis - Carex inops ssp. heliophila Herbaceous Vegetation is found in the northern Great Plains on upland plateaus and in open areas surrounded by ponderosa pine forest. It is found on moderate slopes (5-15%) of all aspects at around 1200 m elevation. Soils tend to range from loam to sandy loam. *Festuca idahoensis* is clearly dominant, and *Carex inops* ssp. *heliophila* (= *Carex heliophila*) is constant and abundant. Also usually present are *Koeleria macrantha* (= *Koeleria pyramidata*), *Artemisia ludoviciana*, *Symphyotrichum ericoideos* (= *Aster ericoideos*), and *Pascopyrum smithii* (= *Agropyron smithii*). *Hesperostipa comata* (= *Stipa comata*) is often present but only as a minor component of the vegetation.

**Environment:** This herbaceous vegetation type is found on moderate slopes (5-15%) of all aspects at around 1200 m elevation. Soils tend to range from loam to sandy loam.

**Vegetation:** Shrubs and forbs are present, but this type is clearly dominated by graminoids, with *Festuca idahoensis* being the most prominent species. There is often some exposed soil.

**GRank & Reasons:** G3 (96-02-01).

**Comments:** This vegetation type was documented on an unglaciated landscape and may not occur on the glaciated portions of the Great Plains. *Festuca idahoensis - Carex inops ssp. heliophila* Herbaceous Vegetation (CEGL001610) is separated from *Hesperostipa comata - Carex inops ssp. heliophila* of Hansen and Hoffman (1988) by the predominance of *Festuca idahoensis* and by the lack of significant cover of *Hesperostipa comata* (= *Stipa comata*). The *Festuca idahoensis - Carex inops ssp. heliophila* type also has less forb coverage, less leaf litter and more exposed soil (ibid.). Several studies have documented *Festuca idahoensis* types that have *Carex* ssp. as a dominant associate. Generally however, the species of *Carex* noted as predominant is different. *Carex obtusata* is listed as a main component for a number of types (Hansen and Hoffman 1988). Mueggler and Stewart (1980) note a *Festuca idahoensis - Carex filifolia* habitat type.

**ELEMENT DISTRIBUTION**

**Range:** This community is found in Montana.

**States/Provinces:** MT:S3

**ELEMENT SOURCES**

**Authors:** WCS  Confidence: 1  Identifier: CEGL001610

V.A.5.N.d.22. PSEUDOROEGERNIA SPICATA HERBACEOUS ALLIANCE

**PSEUDOROEGERNIA SPICATA - BOUTELOUA CURTIPENDULA HERBACEOUS VEGETATION**
Bluebunch Wheatgrass - Sideoats Grama Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This mixedgrass association ranges in size from small to large patches which are located on foothills and sideslopes along major drainages between the Tongue and Powder rivers of southeastern Montana. This type is considered a topo-edaphic climax by Hansen and Hoffman (1988) because it occurs on moderate to steep (>$45\%$) slopes the surfaces of which are strewn with large amounts of irregularly shaped, iron oxide porcelainite shale (scoria). The surface resulted from fires in contiguous coal beds (but the soils are conventional loams). The harsh sites of this type result in a unique depauperate community with the lowest total cover and graminoid cover of any southeastern Montana type inventoried by Hansen and Hoffman (1988). However, it still has greater cover...
and is more productive than those communities associated with bentonite deposits and acid shales. *Pseudoroegneria spicata* is strongly dominant (canopy cover ranging from 40-60%) with *Bouteloua curtipendula* exhibiting less than one-fourth this value. *Pascopyrum smithii* (= *Agropyron smithii*) and *Schizachyrium scoparium* are consistently present with cover less than 10%. Forbs are a minor component with *Lygodesmia juncea*, *Echinacea angustifolia* and *Pediomelum argophyllum* (= *Psoralea argophylla*) having the highest fidelity to the type.

**Environment:** This type occurs as small to large patches located on foothills and sideslopes along major drainages between the Tongue and Powder rivers of southeastern Montana; known elevations range between 3100 and 3800 feet. This type is considered a topographic climax by Hansen and Hoffman (1988) because it occurs on moderate to steep (>45%) slopes, the surfaces of which are strewn with large amounts of irregularly shaped, iron oxide porcelanite shale (scoria) that has resulted from ancient fires in contiguous coal beds. The soils are conventional loams but shallow and excessively drained.

**Vegetation:** *Pseudoroegneria spicata* is strongly dominant (canopy cover ranging from 40-60%) with *Bouteloua curtipendula* exhibiting less than one-fourth this cover value. *Pascopyrum smithii* (= *Agropyron smithii*) and *Schizachyrium scoparium* are consistently present with cover less than 10%. Forbs are a minor component with *Lygodesmia juncea*, *Echinacea angustifolia* and *Pediomelum argophyllum* (= *Psoralea argophylla*) having the highest fidelity to the type. The shrubs (subshrubs) *Rhus trilobata*, *Gutierrezia sarothrae* and *Artemisia frigida* are consistently present with low coverage values (less than 5%).

**Dynamics:** Given the low cover and patchiness of this type, fires probably burned in a mosaic fashion with reduced intensity. Pronghorn antelope use these sites for grazing and predator detection.

**GRank & Reasons:** G3 (99-12-01). As currently understood, this type is restricted both geographically and with regard to site parameters. However, appropriate habitat in Wyoming overlaps the distribution of the characteristic species, so inventory may yield more occurrences. Threats to this type could potentially come from domestic stock, but sites are generally somewhat removed from water. These sites are generally not conducive to alien *Bromus* species, but their potential to support other weeds is unknown.

**Comments:** *Pseudoroegneria spicata* - *Bouteloua curtipendula* appears to be endemic to southeastern Montana, occurring between the Tongue and Powder rivers. Other portions of southeastern Montana and adjacent Wyoming would appear to have appropriate habitat (soils derived from scoria clinker) but lack populations of *Bouteloua curtipendula* or *Pseudoroegneria spicata* because they are at the extreme western and eastern extensions of their respective ranges and consequently sporadically distributed. There would seem to be some sites intermediate between *Rhus trilobata* / *Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001120) and this type and for which it would be helpful to have an arbitrary cover cutoff value for *Rhus trilobata* for assigning stands to types. In the Rapid Ecological Assessment of the Northern Great Plains this type was recorded but once (Martin et al. 1998). *Rhus trilobata* / *Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001120) differs from this community by having *Rhus trilobata* dominant or at least well represented. *Pseudoroegneria spicata* - *Carex filifolia* Herbaceous Vegetation (CEGL001665) differs from this association by lacking *Bouteloua curtipendula* and having *Carex filifolia* with at least 5% cover, though it may not be the dominant graminoid. *Pseudoroegneria spicata* - *Bouteloua gracilis* Herbaceous Vegetation (CEGL001664) of western Montana occurs for the most part west of the distribution of *Bouteloua curtipendula* and where *Bouteloua gracilis* is the undergrowth dominant.

**ELEMENT DISTRIBUTION**

**Range:** This association has been recorded for only southeastern Montana, though appropriate habitat ostensibly occurs in northeastern Wyoming and westernmost North Dakota.

**States/Provinces:** MT: S3, ND: S?, WY?

**ELEMENT SOURCES**

**Authors:** S.V. Cooper, WCS; mod. B. L. Heidel, MTNHP  **Confidence:** 2  **Identifier:** CEGL001663

**PSEUDOROEGNERIA SPICATA - CAREX FILIFOLIA HERBACEOUS VEGETATION**

Bluebunch Wheatgrass - Threadleaf Sedge Herbaceous Vegetation

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**ELEMENT CONCEPT**

**Summary:** Stands of this association occur on level or gently sloping upland sites with loam or silt loam soils. This is an herbaceous vegetation type in which graminoids contribute most of the cover. A number of forbs may be present, but forbs and shrubs contribute little cover to the vegetation. *Pseudoroegneria spicata* dominates the vegetation, and *Carex filifolia* contributes substantial cover. Small amounts of *Bouteloua gracilis* may be present.

**Environment:** Stands of this association have been described from nearly level sites (some windswept) with loam and silt loam soils. Elevations range from about 4100 feet on the Great Plains to about 7000 feet on the west flank of the Bighorn Mountains.

**Vegetation:** Graminoids contribute most of the cover, and forbs are secondary; shrubs may be present as scattered individuals or clumps that contribute little cover to the vegetation. *Pseudoroegneria spicata* dominates the vegetation, and *Carex filifolia* contributes substantial cover. *Hesperostipa comata* (= *Stipa comata*), *Koeleria macrantha*, and *Carex inops* ssp. *heliophila* (= *Carex heliophila*) (in Great Plains stands) often are present in smaller amounts, but they may contribute as much cover as does *Carex filifolia*. *Bouteloua gracilis* is absent or present only in small amounts. *Cheatgrass* (*Bromus japonicus*, *Bromus tectorum*) is present in many stands and may contribute nearly as much cover as does *Pseudoroegneria spicata*. The vegetation may contain small amounts of numerous forbs. Shrubs are absent or present only as scattered individuals (especially *Artemisia tridentata* ssp. *wyomingensis*), but the subshrubs *Artemisia frigida* and *Gutierrezia sarothrae* usually are present in small amounts.

**GRank & Reasons:** G4 (96-02-01)

**Comments:** This association seems to resemble very closely, in environment and vegetation, the more widespread *Pseudoroegneria spicata* - *Bouteloua gracilis* Herbaceous Vegetation (CEGL001664), except that this association contains little or no *Bouteloua gracilis*. The geographic ranges of the two associations overlap, and it is unclear whether good reasons exist to differentiate the two.

**ELEMENT DISTRIBUTION**

**Range:** This association has been described from two stands in southeastern Montana (Hansen and Hoffman 1988) and from two stands (Fisser 1964) and cursory information (Despain 1973a) in north-central Wyoming.

**States/Provinces:** MT:S4, WY:S?

**ELEMENT SOURCES**

**Authors:** WCS **Confidence:** 1 **Identifier:** CEGL001665


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**PSEUDOROEGNERIA SPICATA - PASCOPYRUM SMITII HERBACEOUS VEGETATION**

Bluebunch Wheatgrass - Western Wheatgrass Herbaceous Vegetation

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**ELEMENT CONCEPT**

**Summary:** This grassland association is found in the northern Great Plains and in the eastern foothills of the northern U.S. Rocky Mountains. Stands generally grow on slopes with shallow soils. *Pseudoroegneria spicata* dominates the vegetation, and rhizomatous wheatgrasses (*Pascopyrum smithii* or *Elymus lanceolatus*) are abundant. Forbs and shrubs contribute little cover.

**Environment:** Stands of this grassland association grow over a broad elevation range, from 2600 feet in Great Plains to 7500 feet in the foothills of the Rocky Mountains. They occur on slopes, from gentle alluvial fans to slopes as steep as 40%, facing all aspects. Substrates are glacial deposits, alluvium, limestone, and calcareous sandstones. Soils usually are shallow, may contain a substantial volume of coarse fragments, and belong to sandy
clay loam, loam, or clay loam textural classes. The sites often are exposed to strong, persistent winds.

Vegetation: Grasses contribute most of the cover and production. *Pseudoroegneria spicata* dominates (usually strongly). The rhizomatous wheatgrasses *Pascopyrum smithii* or *Elymus lanceolatus* (or both) are secondary species, but the rhizomatous wheatgrasses may codominate with *Pseudoroegneria spicata*. *Hesperostipa comata* (= *Stipa comata*), *Koeleria macrantha*, and *Poa secunda* usually are present in smaller amounts, but *Hesperostipa comata* often codominates in west-central Montana (Jorgensen 1979). *Bouteloua gracilis* is absent or is a minor species. *Nassella viridula* (= *Stipa viridula*) contributes substantial cover in some stands, especially in the Great Plains but also in some foothills stands (Mueggler and Stewart's (1980) *Stipa viridula* phase). Stands in the foothills often contain *Poa cusickii*, *Leucopoa kingii*, and *Calamagrostis montana*. In southeastern Montana (Hansen and Hoffman 1988) and northeastern Wyoming (Terwilliger et al. 1979a), *Bouteloua curtipendula* may also occur in the vegetation. Forbs contribute little cover or production, but a number of species may be present, including *Ambrosia psilostachya* (in Great Plains stands), *Draba oligosperma*, *Erigeron compositus*, *Stenotus acaulis* (= *Haplopappus acaulis*), *Heterotheca villosa*, *Sphaeralcea coccinea*, *Phlox hoodii*, *Tragopogon dubius*, and *Vicia americana*. The subshrubs *Artemisia frigida* and *Gutierrezia sarothrae* usually are present in small amounts. Shrubs generally are absent or are present only as scattered individuals, but Tweit and Houston (1980) note that *Tetradymia canescens* may be common and *Chrysothamnus* spp. may form a distinct shrub layer in disturbed stands.

**GRank & Reasons:** G4 (96-02-01).

**Comments:** The inclusion of Hansen and Hoffman's (1988) stand number 25 from southeastern Montana extends the range of variability in vegetation found in this association. That stand contains *Bouteloua curtipendula* as an important species, and its inclusion in this association may be inappropriate. Similarly, it is unclear how much *Bouteloua gracilis* and *Carex flilfolia* should be allowed in the vegetation for a stand to be placed into this association. In *Pseudoroegneria spicata* - *Poa secunda* Herbaceous Vegetation (CEGL001677), rhizomatous wheatgrasses are absent or contribute little cover.

**ELEMENT DISTRIBUTION**

**Range:** This association has been described from western and central Montana (Jorgensen 1979, Mueggler and Stewart 1980, Cooper et al. 1995), northeastern Montana (DeVeicle et al. 1995), southeastern Montana (Hansen and Hoffman 1988), northwestern and west-central Wyoming (Tweit and Houston 1980), and apparently from northeastern Wyoming (Terwilliger et al. 1979a).

**States/Provinces:** MT:S4, WY:S3

**ELEMENT SOURCES**

**Authors:** WCS  Confidence: I  Identifier: CEGL001675


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

**V.A.5.N.j.18. PASCOPYRUM SMITHII TEMPORARILY FLOODED HERBACEOUS ALLIANCE**

**PASCOPYRUM SMITHII - HORDEUM JUBATUM HERBACEOUS VEGETATION**

Western Wheatgrass - Foxtail Barley Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This wheatgrass saline prairie type is found in the northern Great Plains of the United States and adjacent Canada. Stands occur in temporarily flooded sites (playas and stock ponds) with deep, poorly drained, clayey, alkaline-saline soils. Stands occur as small patches in temporarily flooded sites, surrounded by grasslands or shrublands. Grasses dominate the vegetation. *Pascopyrum smithii* (or *Elymus lanceolatus*) and *Hordeum*
Eleocharis spp. Herbaceous Vegetation (CEGL001581) (Bergman and Marcus 1976), or playas where the surface dries and the water table drops more quickly (BLM 1974). This association has not been described well. Further analysis of existing information and additional inventory will be helpful in determining the range of variation in stands of this type and how this type differs from other vegetation types of temporarily flooded sites.

**ELEMENT DISTRIBUTION**

**Range:** This wheatgrass saline prairie type is found in the northern Great Plains of the United States and adjacent Canada, extending from Colorado north to Montana and possibly Saskatchewan.

**States/Provinces:** CO?, MT?, ND:S?, NE?, SK?, WY:S3?

**ELEMENT SOURCES**

**Authors:** WCS

**Confidence:** 2

**Identifier:** CEGL001582


**V.A.5.N.J.11. SPARTINA PECTINATA TEMPORARILY FLOODED HERBACEOUS ALLIANCE**

**SPARTINA PECTINATA WESTERN HERBACEOUS VEGETATION**

**Prairie Cordgrass Western Herbaceous Vegetation**

**ELEMENT CONCEPT**

**Summary:** In Colorado, this is a tallgrass meadow comprised entirely of *Spartina pectinata*. Stands occur in small swales on the plains as well as on floodplains of larger rivers. Stands of this grass have been included in other tallgrass prairie plant associations. On large river floodplains, this type occurs as distinct patches and is distinguished from adjacent riparian types by micro-topography and degree of soil saturation. Weaver (1965) reports that historically, large stands of *Spartina pectinata* occurred on mud flats of the Missouri River. Large stands have been observed south of Denver, now threatened by housing and golf course developments (Steve Kettler pers. comm.).

**Vegetation:**

**GRank & Reasons:** G3? (96-02-01).

**Comments:** Compare this association with *Spartina pectinata - Carex* spp. Herbaceous Vegetation (CEGL001477).

**ELEMENT DISTRIBUTION**

**States/Provinces:** CO:S1, MT:S3?, WA:S1, WY:S7?

Appendix E-40
ELEMENT SOURCES
Authors: WCS; mod. B. L. Heidel, MTNHP  Confidence: 2  Identifier: CEGL001476

V.A.5.N.k. Seasonally flooded temperate or subpolar grassland
V.A.5.N.k.56. CAREX NEBRASCENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

CAREX NEBRASCENSIS HERBACEOUS VEGETATION
Nebraska Sedge Herbaceous Vegetation

ELEMENT CONCEPT

Summary: These minor wetlands occur on the western Great Plains and throughout much of the western U.S. Elevation ranges from 1000-2800 m (3300-9200 feet). Stands form open meadows that occur along the margins of streambanks, flat floodplains, and lakes often forming a band along the alluvial terrace. Stands have also been sampled from marshy areas surrounding springs and below seeps on lower hillslopes. This association is often found on well-developed soil, but occurs on a wide variety of soil types ranging from saturated organics to Mollisols to Entisols. Soils tend to be fine-textured alluvium, ranging from sandy, silty loam, clay loam, or clay to organic and are typically gleyed and mottled near the surface because of the high water table most of the growing season. The vegetation is characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by Carex nebrascensis (25-99% cover), that generally forms small- to medium-sized meadows. Stands often are nearly pure Carex nebrascensis, but a variety of other graminoid species may be present such as Carex praegracilis, Calamagrostis stricta, Deschampsia caespitosa, Eleocharis palustris, Glyceria striata, Juncus balticus, Schoenoplectus pungens (= Scirpus pungens), or Triglochin maritima. Forb cover is generally low, but can be high in moist locations. Common forbs include Eurybia integrifolia (= Aster integrifolius), Geum macrophyllum, Mentha arvensis, Mimulus glabratus, and Ranunculus cymbalaria. Introduced species Poa pratensis, Poa palustris, and Melilotus officinalis may also be common.

Environment: This wetland plant association occurs on the western Great Plains and throughout much of the western U.S. Elevation ranges from 1000-2800 m (3300-9200 feet). Stands form open meadows that occur along the margins of streambanks, flat floodplains, and lakes often forming a band along the alluvial terrace. Stands have also been sampled from marshy areas surrounding springs and below seeps on lower hillslopes. This association is often found on well-developed soil, but occurs on a wide variety of soil types ranging from saturated organics to Mollisols to Entisols. Soils tend to be fine-textured alluvium, ranging from sandy, silty loam, clay loam, or clay to organic and are typically gleyed and mottled near the surface because of the high water table most of the growing season.

Vegetation: These wetlands are characterized by a moderately dense to dense perennial graminoid layer dominated or codominated by Carex nebrascensis (25-99% cover), that generally forms small- to medium-sized meadows. Stands often are nearly pure Carex nebrascensis, but a variety of other graminoid species may be present such as Carex praegracilis, Calamagrostis stricta, Deschampsia caespitosa, Eleocharis palustris, Glyceria striata, Juncus balticus, Schoenoplectus pungens (= Scirpus pungens), or Triglochin maritima. Forb cover is generally low, but can be high in moist locations. Common forbs include Eurybia integrifolia (= Aster integrifolius), Geum macrophyllum, Mentha arvensis, Mimulus glabratus, and Ranunculus cymbalaria. Introduced species Poa pratensis, Poa palustris, and Melilotus officinalis may also be common.

In Nebraska, common species include Agrostis stolonifera, Carex hysterica, Carex pellita (= Carex lanuginosa), Eleocharis erythropoda, Equisetum spp., Juncus balticus, Schoenoplectus pungens (= Scirpus pungens), and Triglochin spp. (Steinauer and Rolfsmeier 2000).

Dynamics: In Montana, the Carex nebrascensis Community Type is considered a grazing-discclimax. Under season-long grazing, Carex nebrascensis increases in abundance, replacing former dominant species (Hansen et al. 1995). However, under extreme grazing conditions and a resulting drop in the water table, Juncus balticus or Poa pratensis can eventually replace Carex nebrascensis. In Nevada, sites dominated by Carex nebrascensis are
considered the Potential Natural Community (Manning and Padgett 1995), which appears to be the case in undisturbed stands in Colorado.

**GRank & Reasons:** G4 (96-02-01). This type is widely distributed, but many examples have been heavily grazed by cattle, lowering their floristic quality.

**Comments:** In the Black Hills, classification of stands was problematic due to identification problems with Carex nebrascensis and Carex aquatica. The two are difficult to distinguish based on available keys and written descriptions (Marriott and Faber-Langendoen 2000).

**ELEMENT DISTRIBUTION**

**Range:** This sedge meadow type is widely distributed from the western Great Plains into the western mountains of the United States, ranging from South Dakota and Montana to possibly as far west as Washington, south to California and east to New Mexico.


**ELEMENT SOURCES**

**Authors:** J. Drake, mod. D. Faber-Langendoen, mod. K.A. Schulz, WCS

**Confidence:** I

**Identifier:** CEGL001813


**V.A.5.N.K.53. CAREX PELLITA SEASONALLY FLOODED HERBACEOUS ALLIANCE**

**CAREX PELLITA - CALAMAGROSTIS STRICTA HERBACEOUS VEGETATION**

**Woolly Sedge - Western Bluejoint Herbaceous Vegetation**

**ELEMENT CONCEPT**

**Summary:** This sedge-bluejoint wet meadow is found in the northern tallgrass prairie region and in the northeastern Great Plains. Stands occur on level ground in shallow depressions and other lowlands on poorly drained sandy, loamy, or silty clay soils. Standing water may be present for a few to several weeks during most years. Soil pH is circumneutral to somewhat alkaline and organic content can be moderately high. The vegetation of this community provides approximately 100% cover and the dominant vegetation is graminoids, typically 0.5-1.0 m tall. Forbs can be common, but shrubs are rarely found in this type. The most abundant species are Calamagrostis stricta, Carex pellita (= Carex lanuginosa), Carex sartwellii, Anemone canadensis, Apocynum cannabinum, Symphyotrichum lanceolatum (= Aster lanceolatus), Eleocharis compressa, Juncus balticus, Phalaris arundinacea, Polygonum amphibium, and Schoenoplectus americanus (= Scirpus americanus). Carex buxbaumii may be common, except in North Dakota.

**Environment:** 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.

**Vegetation:** 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). shrubs are rarely found in this type. The most abundant species are Calamagrostis stricta, Carex pellita (= Carex lanuginosa), Carex sartwellii, Anemone canadensis, Apocynum cannabinum, Symphyotrichum lanceolatum (= Aster lanceolatus), Eleocharis compressa, Juncus balticus, Phalaris
arundinacea, Polygonum amphibium, and Schoenoplectus americanus (= Scirpus americanus). Carex buxbaumii can be common, except in North Dakota.

**GRank & Reasons:** G3G5 (98-06-22).

**Comments:** Type concept is a little unclear. Simple dominance by Carex lanuginosa (now Carex pellita in Kartesz 1994) may not be adequate. Hydrologic placement is difficult, ranging from seasonally flooded to temporarily flooded. This type may simply be a part of Spartina pectinata - Calamagrostis stricta - Carex spp. Herbaceous Vegetation (CEGL002027) (wet prairie), or vice versa. See also Carex pellita Herbaceous Vegetation (CEGL001809).

**Range:** This sedge-bluejoint wet meadow is found in the northern tallgrass prairie region and in the northeastern Great Plains, ranging from northern Iowa, western Minnesota, and the Dakotas to parts of the Canadian prairie provinces.

**States/Provinces:** IA:SU, MB:SU, MN:S?, MT:S3?, ND:S?, SD:S?, SK:S?

**ELEMENT SOURCES**
Authors: J. Drake, mod. D. Faber-Langendoen, MCS
Confidence: 3
Identifier: CEGL002254

**V.A.5.N.K.61. ELEOCHARIS PALUSTRIS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

**ELEOCHARIS PALUSTRIS HERBACEOUS VEGETATION**
Marsh Spikerush Herbaceous Vegetation

**Element Concept**

**Summary:** This spikerush wet meadow community is found in the central Great Plains of the United States and Canada and in the western United States. Stands occur in small depressions in intermittent streambeds or depression ponds that flood early in the season and may dry out by summer. Stands are composed of submersed and emergent rooted vegetation under 1 m tall that is dominated by Eleocharis palustris, often in nearly pure stands. Soils are generally fine-textured.

**Environment:** This wetland occurs across the central and northwestern Great Plains and western United States. Elevations range from near sea level to 3050 m (in Colorado). In eastern Washington and Idaho it occurs in valleys and canyon bottoms with low-gradient streams, sloughs, and along the margins of ponds and lakes (Kovalchik 1993). In northwest Nebraska and southwest South Dakota, this community occurs in small depressions in intermittent streambeds and depression ponds that flood early in the season and dry out by summer. Soils are silty clay formed from weathered siltstone and shale (Steinauer and Rolfsmeier 1997). In southwestern South Dakota, the type occupies depression ponds in prairies (H. Marriott pers. comm. 1999). In Utah stands are described from small playas on floodplain terraces of a large river (Von Loh 2000).

In Colorado this community type occurs on the bottom of ephemeral ponds or playas (Baker and Kennedy 1985), or is associated with small to moderate-sized ponds or the edges of larger lakes and reservoirs (Bunin 1985, Padgett et al. 1989). The sites are generally only seasonally flooded, but remain moist throughout the year (Bunin 1985, Padgett et al. 1989). Elevations range from 1525-2750 m (5000-9020 feet).

The soils of Baker and Kennedy's (1985) stands were derived from Quaternary alluvium, with a heavy clay content and an average pH of 7.8, slightly alkaline. The soils reported by Padgett et al. (1989) were mineral soils with fine-loamy to fine particle sizes or organic. They are commonly ponded throughout the growing season and have developed from pond siltation. Hansen et al. (1988a) indicate that Eleocharis palustris is alkaline-tolerant.
Vegetation: This wetland association is dominated by submerged and emergent rooted vegetation under 1 m tall and occurs across the northwestern Great Plains and western U.S. within a wide elevational range. The species composition can be quite variable, but this community is easy to recognized by the bright green, nearly pure stands of *Eleocharis palustris*. Vegetation cover can be sparse to dense (10-90%), but *Eleocharis palustris* is the dominant species, and the only species with 100% constancy. Other species, when present, can contribute as much as 40% cover, but never exceed that of the *Eleocharis palustris* cover. Some of this variation is described from Colorado (Kittel et al. 1999, Baker and Kennedy 1985). Co-occurring species in low-elevation stands on the western slope can include *Phalaris arundinacea (= Phalaroides arundinacea)*, *Juncus balticus*, *Hordeum jubatum*, *Pascopyrum smithii*, *Schoenoplectus americanus (= Scirpus americanus)*, *Sparganium angustifolium*, species of *Leersia* and *Potamogeton*, as well as the introduced *Melilotus officinalis* and *Bromus inermis*. On the eastern plains of Colorado co-occurring species can include *Leersia oryzoides*, *Schoenoplectus pungens (= Scirpus pungens)*, *Panicum virgatum*, *Carex pellita (= Carex lanuginosa)*, and *Spartina pectinata*. At montane elevations, other graminoids, such as *Carex aquatilis*, *Carex utriculata*, and *Deschampsia caespitosa* are present. Forb cover is typically low, but can be occasionally abundant (30%) in some stands. Forb species include *Pedicularis groenlandica*, *Rhodiola integrifolia*, and *Caltha leptosepala*.

In stands from eastern Washington, associates include *Carex utriculata*, *Cicuta douglasi*, and species of *Glyceria* and *Potamogeton*. In northwestern Nebraska, stands are dominated *Eleocharis acicularis* and *Eleocharis palustris* which commonly cover the bottoms of the pools and emerge above the water as the pools dry out. Ephemeral submerged aquatics, such as *Callitriche palustris (= Callitriche verna)*, *Potamogeton diversifolius* and *Marsilea vestita*, may be present. As the pools dry out in mid-summer, ephemeral annual forbs, such as *Limosella aquatica* and *Plagiobothrys scouleri*, may appear. By late summer *Amaranthus californicus* and *Gnaphalium palustre* may dominate in the lowest parts of the depression (Steinauer and Rolfsmeier 1997). In southwestern South Dakota, vegetation is composed of nearly homogeneous stands of *Eleocharis palustris*. Other emergents, such as *Polygonum amphibium*, *Marsilea vestita*, and *Eleocharis ovata*, are occasionally found. Herbaceous cover is greater than 75% except in areas of deeper open water where floating and submerged aquatic plants occur, including *Bacopa rotundifolia* and *Heteranthera limosa* (H. Marriott pers. comm. 1999). In lower elevation Utah stands *Glaux maritima*, *Distichlis spicata*, and *Juncus balticus* were important associates (Brotherson and Barnes 1984).

Few stand data are available for Colorado examples. Generally, it appears that this community is dominated by *Eleocharis palustris*, forming a scattered to dense overstory, often with few associated species. Commonly associated graminoids include *Hordeum jubatum* and *Pascopyrum smithii*. Forbs present may include *Atriplex argentea*, *Polygonum aviculare*, and *Rorippa setulata* (Baker and Kennedy 1985). The higher elevation stands may include a slightly different suite of species, but no stand data are available. Ramaley (1942) described a *Distichlis spicata*-dominated salt meadow on a lakeshore in the San Luis Valley which was ringed by *Eleocharis palustris*. Communities in Utah include *Eleocharis acicularis* and *Alopecurus aequalis* as likely associates (Padgett et al. 1989).

Dynamics: The hydrological regime is critically important to this association. Most stands are seasonally to permanently flooded, although some in the Great Plains occur under intermittently to temporarily flooded conditions.

Baker and Kennedy (1985) suggest that domestic livestock grazing may tend to result in increases in *Hordeum jubatum*, *Bassia scoparia*, and *Polygonum aviculare*. However, Hansen et al. (1988a) suggest that palatability of *Eleocharis palustris* is low for both domestic and wild animals, but that heavy grazing may increase this rhizomatous species and spread it onto adjacent sites. Trampling damage may occur to this type when animals heavily use the sites supporting it, particularly during drought years (Hansen et al. 1988a). Water level fluctuations over a year of greater than 1 m will not support this type (Hansen et al. 1988a).

**G Rank & Reasons: G5 (96-02-01).**

**Element Distribution**

Range: This spikerush wet meadow community is found in the central Great Plains of the United States and Canada and in the western United States.
**ELEMENT SOURCES**

Authors: D. Faber-Langendoen, mod. K. Schulz, mod. M.S. Reid, WCS
Confidence: 1
Identifier: CEGL001833


**V.A.5.N.K.13. JUNCUS BALTICUS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

**JUNCUS BALTICUS HERBACEOUS VEGETATION**

Baltic Rush Herbaceous Vegetation

**ELEMENT CONCEPT**

**Summary:** This Baltic rush wet meadow community is found widely throughout the western United States. This wet meadow vegetation occurs as small, dense patches on flat stream benches, along overflow channels, and near springs. Soils are usually sandy clay loam or fine sands and mottled or gleyed. Stands are characterized by a dense sward of *Juncus balticus* and often minor cover of *Carex* species, including *Carex aquatilis*, *Carex praegracilis*, *Carex nebrascensis*, or *Carex utriculata*. Other common species include *Deschampsia caespitosa*, *Distichlis spicata*, *Glyceria striata*, *Hordeum jubatum*, *Muhlenbergia asperifolia*, *Phleum alpinum*, and *Sporobolus airoides*. The introduced perennial sod grasses *Poa pratensis* or *Agrostis stolonifera* codominate some stands.

Forb cover is generally low and includes wetland species like *Caltha leptosepala* and *Dodecatheon pulchellum*. Shrubs are not common. This association is often considered to be a grazing-induced community since it increases with disturbance.

**Environment:** This widespread herbaceous wetland community is found throughout western North America. Elevation ranges from 1420-3500 m. Stands usually occur as small, dense patches on flat to gently sloping sites near seeps and streams. Stream channels are highly variable in size and type ranging from narrow to moderately wide, and deeply entrenched to very sinuous (Kittel et al. 1999). Soils are also variable and range from alluvial sandy and well-drained, to poorly drained silty clay loam, to organic; however, soils tend to be finer-textured, alkaline and may be saline (Brotherson and Barnes 1984, Kittel et al. 1999, Padgett et al. 1989). Cobble and gravel are common on many sites, and gleyed and mottled horizons are often present because of flooding or high water tables (Kittel et al. 1999).

**Vegetation:** This association is characterized by a low (<50 cm), dense graminoid layer dominated by the rhizomatous perennial *Juncus balticus*. Minor cover of *Carex* species, including *Carex aquatilis*, *Carex praegracilis*, *Carex nebrascensis* or *Carex utriculata*, is often present. Other common graminoids include *Deschampsia caespitosa*, *Distichlis spicata*, *Glyceria striata*, *Hordeum jubatum*, *Muhlenbergia asperifolia*, *Phleum alpinum*, and *Sporobolus airoides*. Forb cover is generally low but may include *Caltha leptosepala*, *Glaux maritima*, *Maianthemum stellatum*, and *Dodecatheon pulchellum*. Shrubs are not common, but occasional *Salix* spp. may occur. Some stands may be codominated by the introduced perennial sod grasses *Poa pratensis* or *Agrostis stolonifera*. Other introduced species, such as *Taraxacum officinale*, *Trifolium* spp., *Cirsium arvense*, *Lactuca serriola*, *Phleum pratense*, and *Thinopyrum intermedium*, may occur in disturbed stands.

**Dynamics:** This association is considered by some to be a grazing-induced community because *Juncus balticus* is tolerant of grazing (low palatability when mature) and increases with grazing disturbance (Hansen et al. 1995, Padgett et al. 1989). Nearly pure stands of *Juncus balticus* may indicate that the site was heavily grazed in the past (Hansen et al. 1995). However, this association also occurs as a stable, late-seral community in areas with low disturbance (Kittel and Lederer 1993).
GRank & Reasons: G5 (96-02-01).

Comments: This association is often considered to be a grazing-induced community since it increases with grazing disturbance.

ELEMENT DISTRIBUTION

Range: This Baltic rush wet meadow community is found widely throughout the western United States, ranging from South Dakota and Montana west to Washington, south to possibly California, and east to New Mexico.

States/Provinces: CA?, CO:S5, ID:S5, MT:S5, NM:S4, NV:S7, OR:S5, SD:S7, UT:S3S4, WA:S3S4, WY:S3

ELEMENT SOURCES

Authors: J. Drake, mod. D. Faber-Langendoen, mod. K. Schulz, WCS  Confidence: 1  Identifier: CEGL001838


V.A.5.N.K.20. PHALARIS ARUNDINACEA SEASONALLY FLOODED HERBACEOUS ALLIANCE

PHALARIS ARUNDINACEA WESTERN HERBACEOUS VEGETATION

Reed Canary Grass Western Herbaceous Vegetation

ELEMENT CONCEPT

Summary: This association is reported from throughout Montana, Idaho, northeastern Utah, and the Columbia Basin of Washington, but is likely more widespread in the western United States. Its distribution as a natural type is complicated because this native species is widely cultivated as a forage crop and has escaped and established in wetlands and riparian areas, displacing the local flora. Elevations range from near sea level to 1700 m. Stands are found along riparian areas, pond and lake margins, wet meadows, and intermittent drainages. Soils are commonly fine-textured and may be flooded for brief to extended periods. The vegetation is characterized by a dense, tall herbaceous layer (often >80% canopy cover and 1.5-2 m tall) that is dominated by Phalaris arundinacea, which tends to occur in monocultures. Associated species may include Equisetum arvense, Muhlenbergia asperifolia, Mentha arvensis, Schoenoplectus acutus (= Scirpus acutus), and many other species in trace amounts where disturbed. Introduced species such as Lepidium latifolium, Cirsium arvense, Sonchus oleraceus, Euphorbia esula, and Phleum pratense are common in some stands.

Environment: This association is reported from throughout Montana, Idaho, Washington and northeastern Utah, but is likely more widespread in the western United States. Elevations range from near sea level to 1700 m. Stands are found along riparian areas, pond and lake margins, wet meadows, and intermittent drainages. Sites are flat to rolling. Soils are commonly fine-textured, but can be coarser in texture. Subsoil is often mottled and gleyed (Crawford 2001). Sites are generally flooded during the growing season, but flooding can vary from brief to extended periods.

Vegetation: This association is characterized by a dense, tall herbaceous layer (often >90% canopy cover and 1.5-2 m tall) that is dominated by Phalaris arundinacea, which tends to occur in monocultures. Associated species such as Equisetum arvense, Muhlenbergia asperifolia, Mentha arvensis, Schoenoplectus acutus (= Scirpus acutus), Polygonum amphibium, Solidago canadensis, Urtica dioica, and many other species may be present in trace amounts especially where disturbed. Occasional Populus tremuloides, Salix exigua, Rubus idaeus, or Symphoricarpos albus may be present in some stands. Introduced species such as Lepidium latifolium, Cirsium arvense, Sonchus oleraceus, Euphorbia esula, Poa pratensis, and Phleum pratense are common in some disturbed

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stands.

**Dynamics:** *Phalaris arundinacea* produces abundant herbage and is planted for livestock forage. It is tolerant of moderate grazing by livestock, although heavy grazing will reduce density (Hansen et al. 1995). *Phalaris arundinacea* is a threat to riparian and wetland areas because it spreads rapidly from rhizomes, dominating the sites, and is extremely difficult to remove once established (Hansen et al. 1995). Fire has been used with limited success to control the spread of *Phalaris arundinacea*, but the high water table where it grows makes it difficult to burn during the growing season (Hansen et al. 1995).

Van Loh (2000) found stands growing on selenium-rich sites. It is not known if selenium is translocated into the plant tissue.

**GRank & Reasons:** G5 (99-03-03).

**Comments:** Other natural associations included in this alliance are found throughout the northeastern United States, but this western association's distribution as a natural type is not clear because of extensive planting as a forage crop (Hansen et al. 1995, Hall and Hansen 1997). Further work is required to resolve the natural versus introduced nature of this type in western North America.

**ELEMENT DISTRIBUTION**

**Range:** This association is reported from throughout Montana and Idaho and into northeastern Utah and is likely more widespread in the western United States. Its distribution as a natural type is complicated because this native species is widely cultivated as a forage crop and has escaped and established in many wetlands and riparian areas.

**States/Provinces:** ID:S4?, MT:S4, NM:S4?, UT:S?

**ELEMENT SOURCES**

**Authors:** K. Schulz, WCS  **Confidence:** 1  **Identifier:** CEGL001474  **References:** Bourgon and Engelking 1994, Cooper et al. 1995, Crawford 2001, Driscoll et al. 1984, Hall and Hansen 1997, Hansen et al. 1995, Muldavin et al. 2000a, Von Loh 2000

**V.A.5.N.I. Semipermanently flooded temperate or subpolar grassland**

**V.A.5.N.I.6. SCHOENOPLECTUS PUNGENS SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE**

**SCHOENOPLECTUS PUNGENS HERBACEOUS VEGETATION**

**Threesquare Herbaceous Vegetation**

**ELEMENT CONCEPT**

**Summary:** This bulrush wet meadow community is found in the western United States in the intermountain basins, as well as in western parts of the Great Plains. Stands are found along low-gradient, meandering, usually perennial streams and around the margins of ponds and marshes. *Schoenoplectus pungens* (= *Scirpus pungens*) dominates the dense, 0.3- to 0.6-m tall herbaceous vegetation layer. Other species that often are present include *Schoenoplectus maritimus* (= *Scirpus maritimus*), *Spartina gracilis*, *Hordeum jubatum*, *Pascopyrum smithii*, *Juncus balticus*, *Eleocharis palustris*, *Lemna minor*, *Sagittaria latifolia*, and *Typha* spp. Stands of this association contain no tree or shrub layer, but a few scattered trees and shrubs may be present, most commonly *Populus deltoides*, *Salix amygdaloides*, *Salix exigua*, *Symphoricarpos occidentalis*, or *Sarcobatus vermiculatus*. Substrates are generally dark, organic, fine-textured soils derived from alluvium.

**Environment:** Stands of this widespread association are found throughout much of the western U.S. in appropriate wetland habitat. Elevations range from 1000-2400 m. Stands occur along low-gradient, meandering, usually perennial streams, around the margins of ponds and marshes, in low-lying swales, and abandoned or overflow channels where the soils remain saturated (Hansen et al. 1995, Kittel et al. 1999, Jones and Walford 1995, Walford 1996). It also occurs on silt and sand bars within the active channel. Soils are generally derived from alluvium and are fine-textured, black, alkaline, organic anoxic with gleying. Soils range from normal to saline with pH ranging from 7.4-9.1.
Vegetation: This widespread wetland association is characterized by a dense, 0.3- to 0.6-m tall herbaceous vegetation layer that is dominated by *Schoenoplectus pungens* (= *Scirpus pungens*). Associated species include *Schoenoplectus maritimus* (= *Scirpus maritimus*), *Spartina gracilis*, *Hordeum jubatum*, *Pascopyrum smithii*, *Juncus balticus*, *Eleocharis palustris*, *Lemna minor*, *Sagittaria latifolia*, and *Typha* spp. Stands of this association contain no tree or shrub layer, but a few scattered trees and shrubs may be present, most commonly *Populus deltoides*, *Salix amygdaloides*, *Salix exigua*, *Symphoricarpos occidentalis*, or *Sarcobatus vermiculatus*.

Dynamics: Stands of this association are flooded in the spring (Larson 1993).

GRank & Reasons: G3G4 (98-04-09).

Comments: Muldavin et al. (2000a) described 5 *Schoenoplectus pungens* (= *Scirpus pungens*) community types from New Mexico. Most are codominated with an associated species listed in the vegetation description, e.g., *Eleocharis palustris*, *Distichlis spicata*, *Paspalum distichum*, and *Equisetum laevigatum*, with one being a *Schoenoplectus pungens* Monotype Community Type reported from the Gila River basin. Muldavin et al.'s (2000a) concept of this community type states that it can be dominated by *Schoenoplectus pungens* or *Schoenoplectus americanus* (= *Scirpus americanus*, = *Scirpus olneyi*). Hansen et al. (1995) also include *Schoenoplectus americanus* in their *Scirpus pungens* Habitat Type. This association needs further review to clarify whether to include stands where *Schoenoplectus pungens* is not the dominant species.

**ELEMENT DISTRIBUTION**

Range: This community is found in the western United States in the intermountain basins, as well as in western parts of the Great Plains, from Montana south to Colorado, and west into Nevada, Utah, and Wyoming.


**ELEMENT SOURCES**

Authors: G.P. Jones, mod. K. Schulz, WCS

Confidence: 2

Identifier: CEGL001587


V.A.7.N.e. Medium-tall temperate or subpolar grassland with a sparse needle-leaved or microphyllous evergreen shrub layer

V.A.7.N.e.11. ARTEMISIA CANA SHRUB HERBACEOUS ALLIANCE

**ELEMENT CONCEPT**

Summary: This association has been described from the Great Plains of central and eastern Montana, far western North Dakota, northwestern South Dakota, and northeastern Wyoming. It occupies terraces and floodplains along streams, where alluvium contains more soil water than is available in the uplands. *Artemisia cana* ssp. *cana* dominates the shrub layer, which may also include small amounts of *Symphoricarpos occidentalis*, *Sarcobatus vermiculatus*, or *Chrysothamnus* sp. The undergrowth typically is dense and composed mainly of graminoids, with forbs contributing little cover. *Pascopyrum smithii* often dominates, and in many stands several other species may codominate, especially *Nassella viridula*, *Poa pratensis*, and *Bromus japonicus* (or another exotic, annual brome grass). Exotic grasses (*Poa pratensis*, *Bromus japonicus*) dominate the undergrowth in many stands. *Bouteloua gracilis* and *Carex filifolia*, both more typically upland species, may contribute substantial cover. Common forbs are *Taraxacum* spp. (exotic), *Achillea millefolium*, *Artemisia ludoviciana*, and *Vicia americana*.

Environment: This community is found on flat to gently sloping alluvial terraces and fans near larger creeks and rivers. Thilenius et al. (1995) found that most stands were raised at least 1 m above the general floodplain. Soils are formed from alluvium and are medium- to fine-textured. Flooding may occur frequently.

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Vegetation: This community is dominated by moderately dense to dense graminoids less than 1 m tall. *Pascopyrum smithii* is usually the most abundant among these. *Poa pratensis*, *Bouteloua gracilis*, and *Nassella viridula* are also common. *Calamovilfa longifolia*, *Hesperostipa comata* (= *Stipa comata*), and *Achnatherum hymenoides* (= *Oryzopsis hymenoides*) are sometimes present. Short shrubs, especially *Artemisia cana* and sometimes *Symphoricarpos occidentalis*, have 10-25% cover. Forbs and nonvascular species are generally rare.

**GRank & Reasons:** G4 (00-11-29). This association seems to be common within a large geographic range, occurring from northern Montana as far south as central Wyoming, and from central Montana as far east as west-central South Dakota. It is restricted to mesic swales, terraces and floodplains along streams of nearly any size, where soils are deep and have low to moderate amounts of salts. However, the presence of exotic species *Poa pratensis* and *Bromus japonicus* (or other annual brome grasses) in many of the stands is cause for concern. The global rank has been changed from G3? to G4. Prolonged, heavy grazing by livestock may pose a threat to this association by favoring the grazing-tolerant exotic species.

**Comments:** This association undoubtedly exists, but the amount of variation in species composition and vegetation structure, and the geographic range, must be better documented. It is unclear whether stands in which *Nassella viridula* or *Elymus lanceolatus* ssp. *lanceolatus* dominate or codominate the undergrowth should be included in this association or placed into different associations. For the *Pascopyrum smithii* - *Nassella viridula* Herbaceous Vegetation (CEGL001583), either *Pascopyrum smithii* or *Elymus lanceolatus* ssp. *lanceolatus* may dominate.

This community appears to be very closely related to *Artemisia cana* / *Pascopyrum smithii* Shrubland (CEGL001072) which is found in Montana, western North Dakota, and western South Dakota. The most apparent difference is the cover of shrubs. Further comparison may result in the combination of these two types.

**ELEMENT DISTRIBUTION**

**Range:** This association is known to occur from northern Montana as far south as central Wyoming, and from central Montana as far east as west-central South Dakota.

**States/Provinces:** MT:S?, ND:S?, SD:S?, WY:S3?

**ELEMENT SOURCES**

**Authors:** J. Drake, WCS  
**Confidence:** 1  
**Identifier:** CEGL001556  

**V.A.7.N.G.** Medium-tall temperate or subpolar grassland with a sparse cold-deciduous shrub layer

**V.A.7.N.G.5. RHUS TRILOBATA SHRUB HERBACEOUS ALLIANCE**

**Rhus trilobata** / *Pseudoroegneria spicata* Shrub Herbaceous Vegetation

**Ill-scented Sumac / Bluebunch Wheatgrass Shrub Herbaceous Vegetation**

**ELEMENT CONCEPT**

**Summary:** This shrub prairie type is found in the United States on dry mid to upper slopes and ridgetops in the eastern plains and mountains of Wyoming and Montana. Slope and aspect are variable, but soils are consistently shallow and rocky. Herbaceous species dominate the vegetation with short shrubs and nonvascular plants present but of lesser importance. Total vegetation cover is moderate, and few plants grow taller than 1 m. Shrubs generally have from 10-25% cover. *Rhus trilobata* is the most common. It is often found with *Artemisia frigida*, *Artemisia tridentata*, *Prunus virginiana*, *Ribes cereum*, or *Eriogonum* spp. *Pseudoroegneria spicata* is the most abundant herbaceous species. Others commonly found include *Koeleria macrantha*, *Schizachyrium scoparium*, *Bouteloua curtipendula*, *Bromus tectorum*, and *Opuntia polyacantha*.
Environment: This community is typically found on dry mid to upper slopes and ridgetops. It has been identified on butte tops in eastern Wyoming (Thilenius et al. 1995). Slope and aspect are variable, but soils are consistently shallow and rocky. They often form from sandstone parent materials, and rock fragments, outcrops, and bare soil cover much of the ground (Mueggler and Stewart 1978).

Vegetation: Herbaceous species dominate the vegetation with short shrubs and nonvascular plants present but of lesser importance. Total vegetation cover is moderate (Brown 1971, Thilenius et al. 1995) and few plants grow taller than 1 m. Shrubs generally have from 10-25% cover. *Rhus trilobata* is the most common. It is often found with *Artemisia frigida*, *Artemisia tridentata*, *Prunus virginiana*, *Ribes cereum*, or *Eriogonum* spp. *Pseudoregenia spicata* is the most abundant herbaceous species. Others commonly found include *Koeleria macrantha*, *Schizachyrium scoparium*, *Bouteloua curtipendula*, *Bromus tectorum*, and *Opuntia polyacantha*.

**GRank & Reasons:** G4 (96-02-01).

**ELEMENT DISTRIBUTION**

Range: This shrub prairie type is found in the United States on dry mid to upper slopes and ridgetops in the eastern plains and mountains of Wyoming and Montana.

States/Provinces: MT:S4, WY:S2S3

**ELEMENT SOURCES**

Authors: J. Drake, WCS  
Confidence: 1  
Identifier: CEGL001120  

**V.A.7.N.n. Intermittently flooded temperate or subpolar grassland with a sparse xeromorphic (evergreen and/or deciduous) shrub layer**

**V.A.7.N.n.1. SARCOCATUS VERMICULATUS INTERMITTENTLY FLOODED SHRUB HERBACEOUS ALLIANCE**

**SARCOCATUS VERMICULATUS / PASCOPYRUM SMITHII - (ELYMUS LANCEOLATUS) SHRUB HERBACEOUS VEGETATION**  
Black Greasewood / Western Wheatgrass - (Streamside Wild Rye) Shrub Herbaceous Vegetation

**ELEMENT CONCEPT**

Summary: This greasewood shrub prairie is found in saline habitats in the northwestern Great Plains of the United States and Canada. Stands occur on flat to gently sloping alluvial fans, terraces, lakebeds, and floodplains. The soil is usually deep clay, silty clay, sandy clay, or loam, although coarse soils are possible. They are saline or alkaline, but salt crusts on the surface are typically absent. Parent material is usually alluvium. This community has moderate to dense vegetation cover. Medium-tall (0.5-1.5 m) shrubs are scattered throughout with a total shrub canopy of 10-25%. The shrub layer is dominated by *Sarcobatus vermiculatus*, with *Artemisia tridentata*, *Atriplex confertifolia*, and *Chrysothamnus viscidiflorus* in smaller amounts. *Symphoricarpos occidentalis* and *Rhus aromatica* are sometimes found in more mesic microhabitats within this community. Herbaceous cover is sparse beneath the shrubs and otherwise moderate to dense. The dominant species are typically 0.5-1 m tall. The most abundant species is *Pascopyrum smithii*, usually accompanied by *Bouteloua gracilis*, *Bromus japonicus*, *Bromus tectorum*, and *Hesperostipa comata* (= *Stipa comata*). Few forbs are found in this community. *Achillea millefolium* and *Opuntia polyacantha* are the only species with high constancy. Overall species diversity in this community is low.

Environment: This community is found on flat to gently sloping alluvial fans, terraces, lakebeds, and floodplains (Mueggler and Stewart 1978, Hansen and Hoffman 1988). Dodd and Coupland (1966) found *Sarcobatus vermiculatus* in association with *Pascopyrum smithii* only on the most arid parts of southwestern Saskatchewan. The soil is usually deep clay, silty clay, sandy clay, or loam (Hirsch 1985, Jones and Walford 1995), although coarse soils are possible (USFS 1992, Thilenius et al. 1995). They are saline or alkaline, but salt crusts on the...
surface are absent (Thilenius et al. 1995, but see Steinauer and Rolfsmeier 2000). Parent material is usually alluvium. Flooding during the spring is possible.

**Vegetation:** This community has moderate to dense vegetation cover (Jones and Walford 1995, Thilenius et al. 1995). Medium-tall (0.5-1.5 m) shrubs are scattered throughout, with a total shrub canopy of 10-25% (Hansen and Hoffman 1988, USFS 1992). The shrub layer is dominated by *Sarcobatus vermiculatus*, with *Atriplex confertifolia, Atriplex canescens, Atriplex argentea, Artemisia tridentata*, and *Chrysothamnus viscidiflorus* in smaller amounts. *Symphoricarpos occidentalis* and *Rhus aromatica* are sometimes found in more mesic microhabitats within this community (Hirsch 1985). Herbaceous cover is sparse beneath the shrubs and moderate to dense in between. The dominant species are typically 0.5-1 m tall. The most abundant species is *Pascopyrum smithii*, usually accompanied by *Bouteloua gracilis, Bromus japonicus, Bromus tectorum*, and *Hesperostipa comata (= Stipa comata)*. Few forbs are found in this community. *Achillea millefolium* and *Opuntia polyacantha* are the only species with high constancy. Other species present may include *Grindelia squarrosa*. Overall species diversity in this community is low (Hansen and Hoffman 1988, Von Loh et al. 1999). In Nebraska, shrub species cover may be very low, and saline pockets may contain *Distichlis spicata* and *Sporobolus airoides*. *Astragalus bisulcatus* may be prominent (Steinauer and Rolfsmeier 2000).

**GRank & Reasons:** G4 (96-02-01).

**Comments:** Compare this association with *Sarcobatus vermiculatus / Elymus elymoides - Pascopyrum smithii* Shrubland (CEGL001365) from New Mexico.

See Steinauer and Rolfsmeier (2000) for a description of the stands in Nebraska. *Sarcobatus vermiculatus / Distichlis spicata - (Puccinellia nuttalliana)* Shrub Herbaceous Vegetation (CEGL002146) may be a more saline version of this type.

**ELEMENT DISTRIBUTION**

**Range:** This greasewood shrub prairie is found in saline habitats in the northwestern Great Plains of the United States and Canada, ranging from northwestern Nebraska north to the Dakotas and Saskatchewan.

**States/Provinces:** MT:S4, ND:S4?, NE:S2, SD:SU, SK?, WY:S4

**ELEMENT SOURCES**


Appendix E-51
VII. SPARSE VEGETATION

VII.C.4.N.a. Soil slumps or landslides

VII.C.4.N.a.400. ERIOGONUM PAUCIFLORUM SPARSE VEGETATION ALLIANCE

ERIOGONUM PAUCIFLORUM - GUTIERREZIA SAROTHRAE BADLANDS SPARSE VEGETATION
Small-flower Wild Buckwheat - Snakeweed Badlands Sparse Vegetation

ELEMENT CONCEPT

Summary: This badlands type is found in the northwestern Great Plains, in badlands topography. In Badlands National Park, South Dakota, stands occur 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 is typically flat, and stands occur on erosional outwash fans. Structurally, stands rarely exceed 10% vegetative cover and is often 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. In Badlands National Park, plant species that are nearly always present include the dwarf-shrubs Eriogonum pauciflorum, Gutierrezia sarothrae, Opuntia polyacantha, Atriplex argentea, Cryptantha thyrsiflora, and the forb Grindelia squarrosa. Atriplex canescens dwarf-shrubs were observed throughout the type, but were typically short-statured and scattered in distribution.

Environment: In Badlands National Park, South Dakota, this type is typically found on silty/sandy outwash fans newly deposited by eroding badlands formations. These formations include Cretaceous Pierre shale, Oligocene Brule siltstone and Chadron clayey mudstone and shale, and Miocene Arickaree sandstone. Soils are undeveloped, poor, loose, and easily eroded. The topography is typically flat, and stands occur on erosional outwash fans. One stand, comprised of four-wing saltbush, occupies a large badlands flat and erosion fan (Von Loh et al. 1999).

Vegetation: This badlands community type rarely exceeds 10% vegetative cover and is often 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. In Badlands National Park, plant species that are nearly always present include the dwarf-shrubs Eriogonum pauciflorum, Gutierrezia sarothrae, Opuntia polyacantha, Atriplex argentea, and Cryptantha thyrsiflora, 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).

G Rank & Reasons: G4G5 (00-01-31). In Badlands National Park, South Dakota, this community type occupies badland formations, which cover approximately 45% of the park (Von Loh et al. 1999). It is probably found in other badlands habitats in the Northern Great Plains.

High-ranked species: In Montana, much of the habitat for Astragalus barrii falls within this association.

ELEMENT DISTRIBUTION

Range: This badlands type is found in the northwestern Great Plains in badlands topography or on azonal soils in other than badlands-dominated landscapes.

States/Provinces: MT?, ND:S?, SD:S?

ELEMENT SOURCES

Authors: D. Faber-Langendoen, MCS; mod. B. L. Heidel, MTNHP
Confidence: 3 Identifier: CEGL005270
References: Von Loh et al. 1999

Appendix E-52
Plant Community Descriptions — Literature Cited


Bear Creek Uranium Mine Application. No date. Unpublished report No. 399 prepared for Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne, WY.


Bighorn Coal Mine. No date. Application No. 213-T2, on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne.


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Cotter-Ferguson Project. No date. Application No. 490. On file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne.


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Appendix E-60


MTNHP [Montana Natural Heritage Program]. No date. Unpublished data on file. Helena, MT.


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Appendix E-61


Terwilliger, C., K. Hess, and C. Wasser. 1979a. Key to the preliminary habitat types of Region 2. Addendum to initial progress report for habitat type classification. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Fort Collins, CO.


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