

*Saskatchewan Rangeland Ecosystems*  
*Publication 5*

**Communities on the Sand  
and Sandy Loam Ecosites**

Version 2

A project of the Saskatchewan Prairie Conservation Action Plan



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Saskatchewan Research Council  
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Canada 



## NOTES

- This publication describes native rangeland communities found on the Sand and Sandy Loam Ecosites in the Dry Mixed Grassland, Mixed Grassland, and Aspen Parkland regions of Saskatchewan. Dry Mixed Grassland and Mixed Grassland were combined because data were insufficient for separate classifications.
- In each region, a reference community, typical of ungrazed to lightly grazed areas, and a series of other communities related to increasing grazing impact, are described.
- In assessing rangeland health, this information can be used to pick the community that best fits the area being assessed. The degree of alteration of that community from the reference community can be used to answer Question 1 of the Saskatchewan Rangeland Health Assessment. This may require interpretation, because the area being assessed may not exactly match any of the described types.
- Another approach is to calculate the percent similarity of the area being assessed to the reference community, as a measure of the degree of alteration due to grazing impact. This measure is similar in both concept and result to the traditional range condition scale.
- State-and-transition diagrams are used to show that there may also be transitions related to factors such as exotic invasion or fire regime. These transitions should not be confused with grazing impacts.
- More detailed discussion of the above points can be found in *Publication 1: Ecoregions and Ecosites*.

**PHOTO CREDITS:** Front Cover – Sandy Loam Ecosite in the Mixed Grassland; Page 9 – Needle-and-thread – Wheat-grass - Sedge Community; Page 26 – Open aspen / choke-cherry stand on sand; Page 28 – soil profile in a sandy aspen stand; Page 32 – aspen / Kentucky blue-grass stand on sand. (All photos by Bob Godwin.)

## SUGGESTED CITATION

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**OBTAINING PUBLICATIONS:** *Saskatchewan Rangeland Ecosystems* publications are available on the Prairie Conservation Action Plan website ([http://www.pcap-sk.org/?s=9.resources\\_literature](http://www.pcap-sk.org/?s=9.resources_literature)).



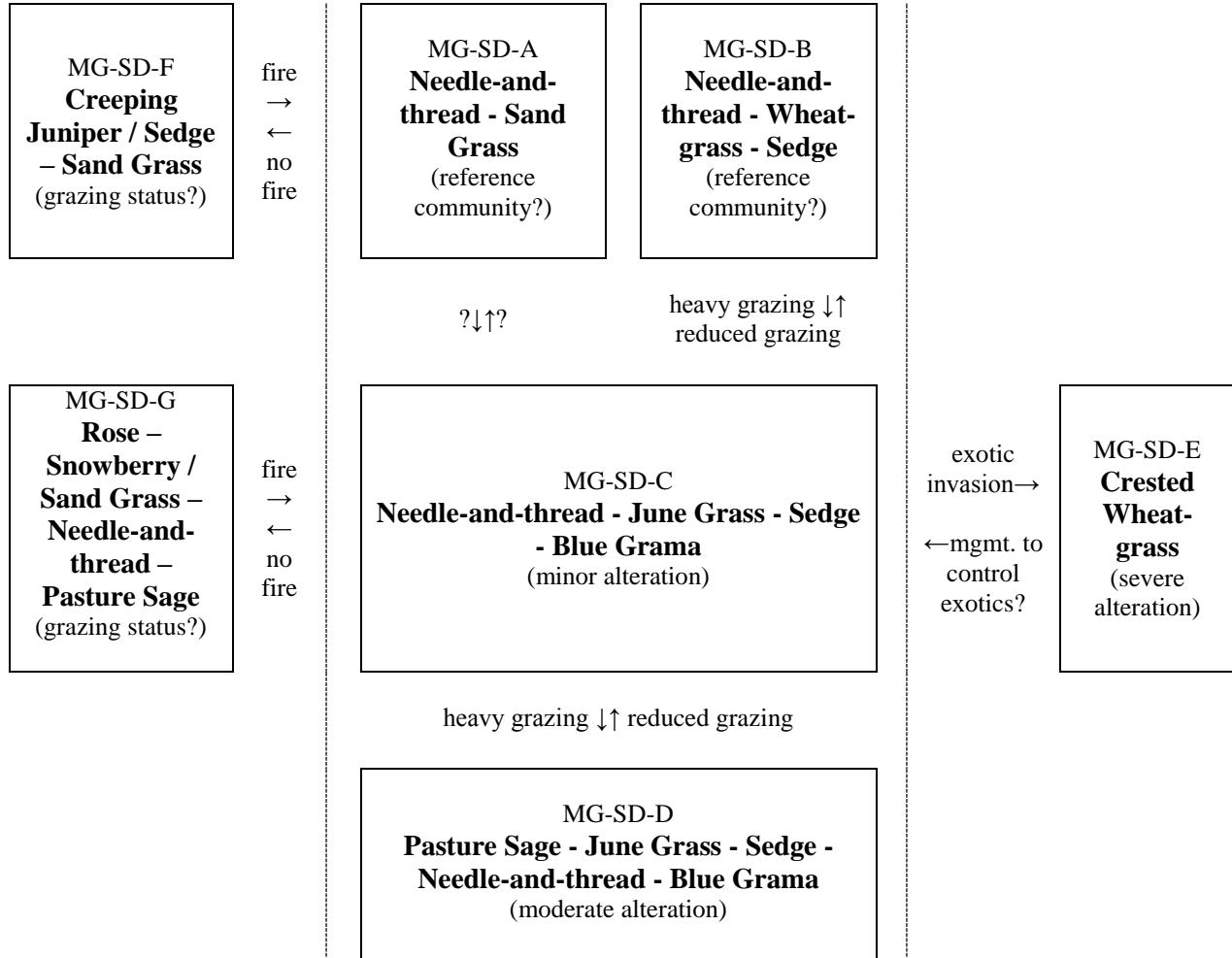
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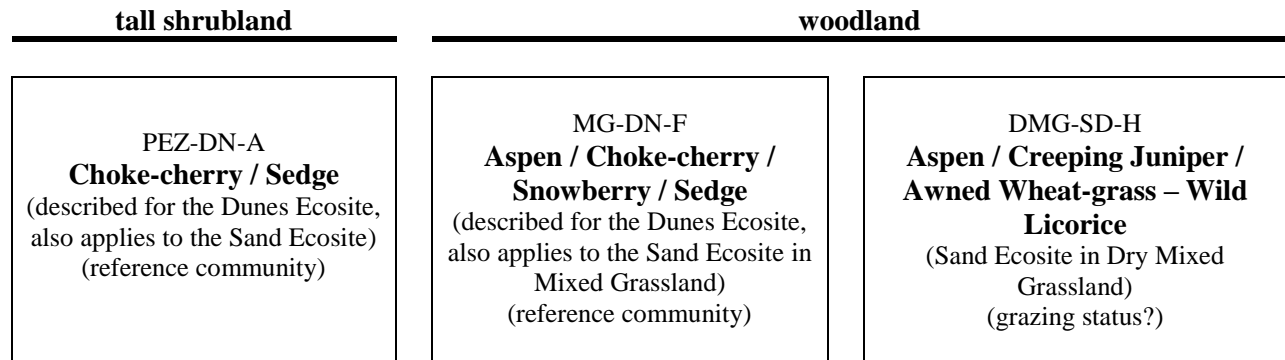


STATE-AND-TRANSITION DIAGRAMS

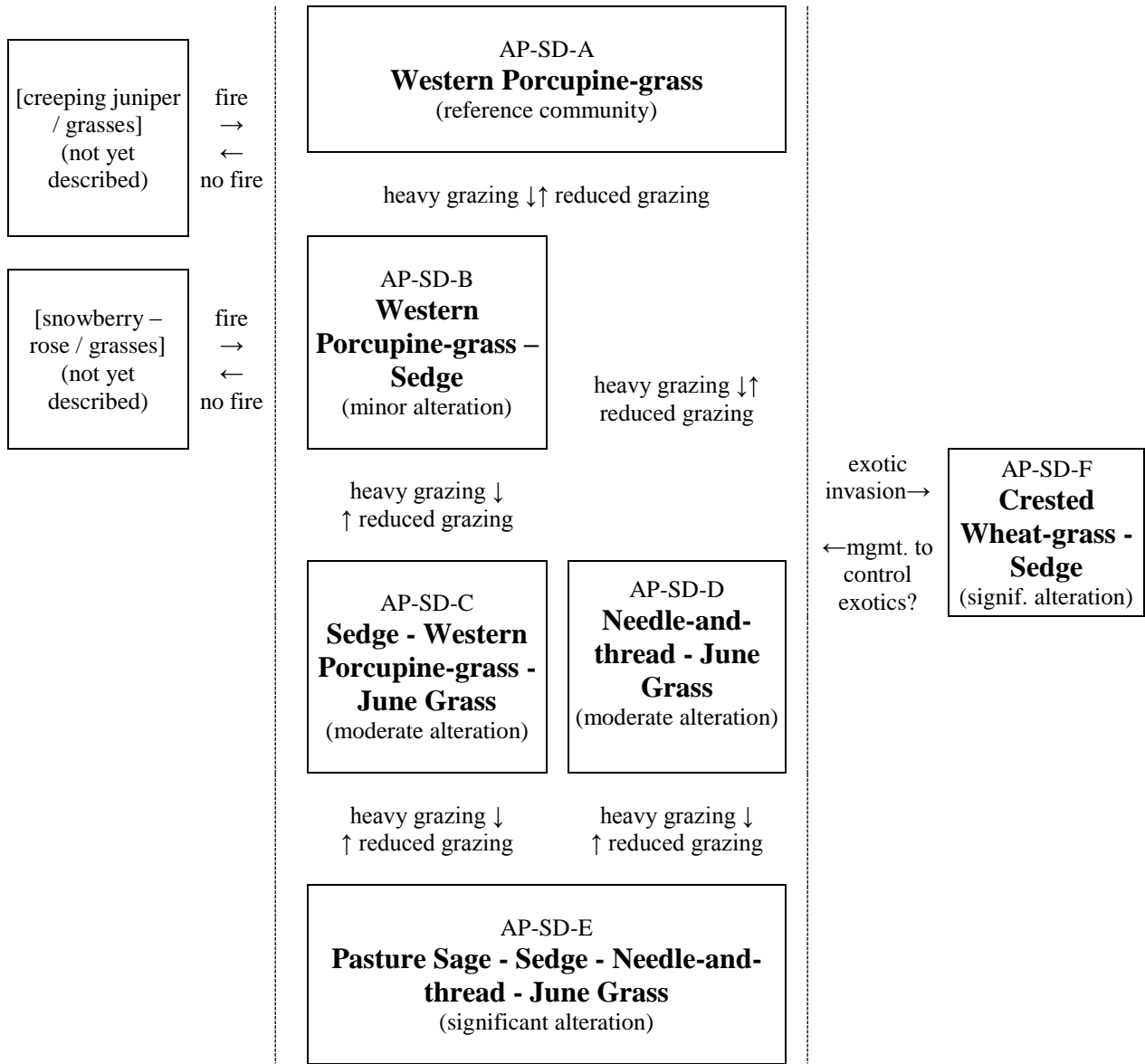
Mixed Grassland and Dry Mixed Grassland: Sand and Sandy Loam Ecosites



Moist Microsites



**Aspen Parkland: Sand and Sandy Loam Ecosites**



**Aspen Parkland: Sand and Sandy Loam Ecosites (continued)**

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**Moist Microsites**

**tall shrubland**

PEZ-DN-A  
**Choke-cherry / Sedge**  
(described for the Dunes Ecosite  
probably also applies to the Sand  
Ecosite)

**woodland**

AP-SD-G  
**Aspen / Choke-cherry - Saskatoon /  
Rose - Snowberry/ Sedge**  
(reference community)

heavy grazing↓  
↑reduced grazing

heavy grazing↓  
↑reduced grazing

AP-SD-H  
**Aspen / Choke-cherry /  
Snowberry - Rose**  
(moderate alteration)

AP-SD-I  
**Aspen /  
Sedge - Purple Oat-  
grass**  
(moderate alteration)

heavy grazing,  
exotic invasion↓  
↑management to  
control exotics?

heavy grazing,  
exotic invasion↓  
↑management to  
control exotics?

AP-SD-J  
**Aspen / Snowberry - Rose /  
Kentucky Blue-grass – Purple Oat-grass**  
(significant alteration)

## COMMUNITY DESCRIPTIONS

### MG-SD-A

### Needle-and-thread - Sand Grass

#### Mixed Grassland and Dry Mixed Grassland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Mixed prairie dominated by midgrasses, but with a significant component of shortgrasses, and lesser components of forbs and half-shrubs. Some cover of erect and prostrate shrubs. **Reference community**, or possibly with minor alteration. May occur on coarser-textured or more recently stabilized sites compared to MG-SD-B.

#### STRUCTURE

tall shrub cover (n=10)	1% (0 - 4)
herbaceous cover (n=27)	40% (26 - 48)
- midgrasses	approx. 25%
- shortgrasses	approx. 10%
- half-shrubs	approx. 5%
- forbs	approx. 5%

short shrub cover (n=11)	1% (0 - 3)
prostrate shrub cover (n=10)	2% (0 - 7)
clubmoss cover (n=24)	4% (0 - 12)
lichen cover (n=6)	3% (0 - 8)
litter cover (n=20)	38% (18 - 53)
bare soil (n=18)	9% (3 - 15)

#### SPECIES COMPOSITION (% biomass, n=33)

<b>Major short shrubs</b>	
silver sagebrush ( <i>Artemisia cana</i> )	3% (0 - 8)
rose ( <i>Rosa spp.</i> )	3% (0 - 6)
western snowberry ( <i>Symphoricarpos occidentalis</i> )	3% (0 - 8)

<b>Major prostrate shrubs</b>	
creeping juniper ( <i>Juniperus horizontalis</i> )	1% (0 - 0)

<b>Major cactus</b>	
prickly-pear ( <i>Opuntia polyacantha</i> )	1% (0 - 4)

<b>Major forbs and half-shrubs</b>	
pasture sage ( <i>Artemisia frigida</i> )	6% (2 - 10)
lance-leaved psoralea ( <i>Psoralidium lanceolatum</i> )	3% (0 - 8)
hairy golden-aster ( <i>Heterotheca villosa</i> )	2% (0 - 7)
goldenrod ( <i>Solidago spp.</i> )	1% (0 - 2)

<b>Major graminoids</b>	
needle-and-thread ( <i>Hesperostipa comata</i> )	29% (21 - 37)
sand grass ( <i>Calamovilfa longifolia</i> )	15% (7 - 24)
sedge ( <i>Carex spp.</i> )	8% (4 - 13)
june grass ( <i>Koeleria macrantha</i> )	6% (2 - 12)
blue grama ( <i>Bouteloua gracilis</i> )	5% (2 - 12)
western wheat-grass ( <i>Pascopyrum smithii</i> )	3% (0 - 7)
plains reed grass ( <i>Calamagrostis montanensis</i> )	2% (0 - 6)
sand dropseed ( <i>Sporobolus cryptandrus</i> )	1% (0 - 3)
northern wheat-grass ( <i>Elymus lanceolatus</i> )	1% (0 - 3)

<b>Minor graminoids</b>	2%
<b>Minor forbs and half-shrubs</b>	3%

<b>SIMILARITY TO REFERENCE COMMUNITY</b>	reference community
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<b>PRODUCTION</b>	graminoids 500 kg/ha	
<b>RECOMMENDED STOCKING RATE</b>		
Dry Mixed Grassland	0.47 AUM/ha	0.19 AUM/ac
Mixed Grassland	0.69 AUM/ha	0.28 AUM/ac

MG-SD-B

**Needle-and-thread - Wheat-grass - Sedge**

**Mixed Grassland and Dry Mixed Grassland: Sand and Sandy Loam Ecosites**

**GENERAL DESCRIPTION:** Mixed prairie dominated by midgrasses, but with significant amounts of shortgrasses, and lesser amounts of forbs and half-shrubs. Shrub cover usually low. **Reference community**, or with only minor alteration. Western and northern wheat-grass are both abundant in the data for this community; also note that there is some potential for confusion between these two species in field surveys.

**STRUCTURE**

herbaceous cover (n=9)	50% (27 - 78)	short shrub cover (n=5)	1% (0 - 1)
- midgrasses	approx. 25%	clubmoss cover (n=8)	11% (3 - 23)
- shortgrasses	approx. 15%	litter cover (n=5)	34% (11 - 51)
- half-shrubs	approx. 35	bare soil (n=8)	5% (0 - 11)
- forbs	approx. 4%		

**SPECIES COMPOSITION** (% biomass, n=23)

<b>Major short shrubs</b>		<b>Major graminoids</b>	
rose ( <i>Rosa spp.</i> )	1% (0 - 3)	needle-and-thread ( <i>Hesperostipa comata</i> )	25% (5 - 42)
western snowberry ( <i>Symphoricarpos occidentalis</i> )	1% (0 - 3)	western wheat-grass ( <i>Pascopyrum smithii</i> )	10% (0 - 28)
		sedge ( <i>Carex spp.</i> )	10% (3 - 23)
<b>Major forbs and half-shrubs</b>		june grass ( <i>Koeleria macrantha</i> )	9% (1 - 20)
pasture sage ( <i>Artemisia frigida</i> )	7% (1 - 11)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	8% (0 - 19)
scarlet mallow ( <i>Sphaeralcea coccinea</i> )	1% (0 - 4)	blue grama ( <i>Bouteloua gracilis</i> )	8% (0 - 22)
lance-leaved psoralea ( <i>Psoraleidium lanceolatum</i> )	1% (0 - 4)	western porcupine-grass ( <i>Hesperostipa curtisetata</i> )	6% (0 - 27)
hairy golden-aster ( <i>Heterotheca villosa</i> )	1% (0 - 5)	sand grass ( <i>Calamovilfa longifolia</i> )	2% (0 - 5)
		Sandberg's blue-grass ( <i>Poa secunda</i> )	1% (0 - 0)
<b>Minor graminoids</b>	1%	blue-grass ( <i>Poa spp.</i> )	1% (0 - 4)
<b>Minor forbs and half-shrubs</b>	4%	plains reed grass ( <i>Calamagrostis montanensis</i> )	1% (0 - 3)
		slender wheat-grass ( <i>Elymus trachycaulus ssp. trachycaulus</i> )	1% (0 - 0)

<b>SIMILARITY TO REFERENCE COMMUNITY</b>	reference community
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<b>PRODUCTION</b>	graminoids 700 kg/ha	
<b>RECOMMENDED STOCKING RATE</b>		
Dry Mixed Grassland	0.47 AUM/ha	0.19 AUM/ac
Mixed Grassland	0.69 AUM/ha	0.28 AUM/ac

MG-SD-C

**Needle-and-thread - June Grass - Sedge - Blue Grama**

**Mixed Grassland and Dry Mixed Grassland: Sand and Sandy Loam Ecosites**

**GENERAL DESCRIPTION:** Mixed prairie with short grasses and midgrasses codominant, and with lesser components of forbs and half-shrubs. Shrub cover usually low. Interpreted as showing **minor alteration** from the reference community as a result of heavy grazing impact. Probably develops from the reference community (MG-SD-B) by decreases in wheat-grasses and western porcupine-grass and increases in june grass, sedges, and blue grama.

**STRUCTURE**

tall shrub cover (n=20)	0% (0 - 1)	short shrub cover (n=20)	2% (0 - 6)
herbaceous cover (n=37)	48% (24 - 73)	clubmoss cover (n=31)	12% (0 - 28)
- midgrasses	approx. 20%	lichen cover (n=14)	7% (0 - 15)
- shortgrasses	approx. 20%	litter cover (n=19)	20% (6 - 30)
- half-shrubs	approx. 5%	bare soil (n=28)	10% (0 - 22)
- forbs	approx. 5%		

**SPECIES COMPOSITION**

**% biomass (n=41)**

**% foliar cover (n=11)**

<b>Major short shrubs</b>	<b>% biomass (n=41)</b>	<b>% foliar cover (n=11)</b>
rose ( <i>Rosa spp.</i> )	2% (0 - 6)	1% (0 - 3)
silver sagebrush ( <i>Artemisia cana</i> )	1% (0 - 2)	0% (0 - 0)
western snowberry ( <i>Symphoricarpos occidentalis</i> )	1% (0 - 4)	1% (0 - 3)
wolf-willow ( <i>Elaeagnus commutata</i> )	1% (0 - 0)	0% (0 - 0)

<b>Major graminoids</b>	<b>% biomass (n=41)</b>	<b>% foliar cover (n=11)</b>
needle-and-thread ( <i>Hesperostipa comata</i> )	22% (4 - 33)	8% (0 - 15)
june grass ( <i>Koeleria macrantha</i> )	14% (2 - 26)	7% (0 - 15)
sedge ( <i>Carex spp.</i> )	13% (4 - 25)	3% (0 - 6)
blue grama ( <i>Bouteloua gracilis</i> )	12% (2 - 23)	13% (0 - 15)
western wheat-grass ( <i>Pascopyrum smithii</i> )	5% (0 - 12)	0% (0 - 0)
sand grass ( <i>Calamovilfa longifolia</i> )	4% (0 - 11)	0% (0 - 0)
northern wheat-grass ( <i>Elymus lanceolatus</i> )	2% (0 - 9)	2% (0 - 3)
plains reed grass ( <i>Calamagrostis montanensis</i> )	1% (0 - 4)	0% (0 - 0)
western porcupine-grass ( <i>Hesperostipa curtiseta</i> )	1% (0 - 1)	0% (0 - 0)
blue-grass ( <i>Poa spp.</i> )	1% (0 - 0)	0% (0 - 0)
sand dropseed ( <i>Sporobolus cryptandrus</i> )	1% (0 - 1)	0% (0 - 0)
crested wheat-grass ( <i>Agropyron cristatum</i> )	0% (0 - 0)	1% (0 - 3)

<b>Major forbs and half-shrubs</b>	<b>% biomass (n=41)</b>	<b>% foliar cover (n=11)</b>
pasture sage ( <i>Artemisia frigida</i> )	8% (2 - 16)	6% (0 - 15)
hairy golden-aster ( <i>Heterotheca villosa</i> )	2% (0 - 4)	0% (0 - 0)
lance-leaved psoralea ( <i>Psoralidium lanceolatum</i> )	1% (0 - 4)	0% (0 - 0)
prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 2)	0% (0 - 0)
moss phlox ( <i>Phlox hoodii</i> )	1% (0 - 2)	1% (0 - 3)
broomweed ( <i>Gutierrezia diversifolia</i> )	0% (0 - 0)	1% (0 - 3)



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	<b>% biomass</b>	<b>% foliar cover</b>
<b>Minor graminoids</b>	2%	0%
<b>Minor forbs and half-shrubs</b>	5%	3%

<b>SIMILARITY TO REFERENCE COMMUNITY (MG-SD-B)</b>	75%
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<b>PRODUCTION</b>	graminoids 500 kg/ha; forbs 150 kg/ha	
<b>RECOMMENDED STOCKING RATE</b>		
Dry Mixed Grassland	0.47 AUM/ha	0.19 AUM/ac
Mixed Grassland	0.69 AUM/ha	0.28 AUM/ac



MG-SD-D

**Pasture Sage - June Grass - Sedge - Needle-and-thread - Blue Grama**  
Mixed Grassland and Dry Mixed Grassland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Mixed prairie dominated by shortgrasses, with lesser components of midgrasses, half-shrubs and forbs. Shrub cover usually low. Interpreted as showing **moderate alteration** from the reference community as a result of heavy grazing impact. Probably develops from MG-SD-C by decrease in needle-and-thread and increase in pasture sage.

**STRUCTURE**

short shrub cover (n=24)	1% (0 - 4)	cactus cover (n=24)	0% (0 - 1)
herbaceous cover (n=34)	46% (23 - 73)	clubmoss cover (n=25)	17% (0 - 38)
- midgrasses	approx. 10%	lichen cover (n=21)	5% (0 - 15)
- shortgrasses	approx. 20%	litter cover (n=11)	14% (0 - 24)
- half-shrubs	approx. 10%	bare soil (n=29)	7% (0 - 23)
- forbs	approx. 10%		

**SPECIES COMPOSITION**

	<b>% biomass (n=23)</b>	<b>% foliar cover (n=19)</b>
<b>Major short shrubs</b>		
rose ( <i>Rosa spp.</i> )	1% (0 - 5)	1% (0 - 1)
silver sagebrush ( <i>Artemisia cana</i> )	1% (0 - 2)	
wolf-willow ( <i>Elaeagnus commutata</i> )	1% (0 - 2)	

**Major graminoids**

june grass ( <i>Koeleria macrantha</i> )	16% (2 - 33)	4% (0 - 15)
sedge ( <i>Carex spp.</i> )	12% (2 - 20)	7% (0 - 22)
needle-and-thread ( <i>Hesperostipa comata</i> )	12% (2 - 25)	5% (0 - 15)
blue grama ( <i>Bouteloua gracilis</i> )	10% (1 - 19)	4% (0 - 5)
western wheat-grass ( <i>Pascopyrum smithii</i> )	3% (0 - 7)	
sand grass ( <i>Calamovilfa longifolia</i> )	2% (0 - 6)	
plains reed grass ( <i>Calamagrostis montanensis</i> )	2% (0 - 5)	
Sandberg's blue-grass ( <i>Poa secunda</i> )	1% (0 - 2)	
blue-grass ( <i>Poa spp.</i> )	1% (0 - 5)	
northern wheat-grass ( <i>Elymus lanceolatus</i> )	1% (0 - 4)	
western porcupine-grass ( <i>Hesperostipa curtisetata</i> )	1% (0 - 0)	
sand dropseed ( <i>Sporobolus cryptandrus</i> )	1% (0 - 2)	
rush ( <i>Juncus spp.</i> )	1% (0 - 1)	
crested wheat-grass ( <i>Agropyron cristatum</i> )	1% (0 - 0)	
Rocky Mountain fescue ( <i>Festuca saximontana</i> )	1% (0 - 1)	

**Major forbs and half-shrubs**

pasture sage ( <i>Artemisia frigida</i> )	16% (5 - 24)	7% (0 - 15)
lance-leaved psoralea ( <i>Psoralidium lanceolatum</i> )	2% (0 - 5)	
moss phlox ( <i>Phlox hoodii</i> )	2% (0 - 7)	5% (0 - 15)
hairy golden-aster ( <i>Heterotheca villosa</i> )	1% (0 - 3)	1% (0 - 3)
locoweed ( <i>Oxytropis spp.</i> )	1% (0 - 0)	
lamb's-quarters ( <i>Chenopodium album</i> )	1% (0 - 0)	
dotted blazingstar ( <i>Liatris punctata</i> )	1% (0 - 2)	

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	<b>% biomass</b>	<b>% foliar cover</b>
scarlet mallow ( <i>Sphaeralcea coccinea</i> )	1% (0 - 1)	
tufted fleabane ( <i>Erigeron caespitosus</i> )		1% (0 - 0)
silver-leaved psoralea ( <i>Pedimelum argophyllum</i> )		1% (0 - 0)

<b>Minor graminoids</b>	2%	1%
<b>Minor forbs and half-shrubs</b>	6%	3%

<b>SIMILARITY TO REFERENCE COMMUNITY (MG-SD-B)</b>	63%
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<b>PRODUCTION</b>	insufficient data	
<b>RECOMMENDED STOCKING RATE</b>		
Dry Mixed Grassland	0.38 AUM/ha	0.15 AUM/ac
Mixed Grassland	0.55 AUM/ha	0.22 AUM/ac

**MG-SD-E  
Crested Wheat-grass  
Mixed Grassland and Dry Mixed Grassland: Sand and Sandy Loam Ecosites**

**GENERAL DESCRIPTION:** Grassland strongly dominated by exotic midgrasses, with lesser components of native grasses, forbs, and half-shrubs. Some shrub cover. Interpreted as showing **severe alteration** from the reference community as a result of exotic invasion. However, may include some old seeded stands that have been reinvaded by native species.

**STRUCTURE**

herbaceous cover (n=10)	58% (42 - 88)	clubmoss cover (n=8)	4% (0 - 11)
- midgrasses	approx. 40%	litter cover (n=8)	38% (28 - 49)
- shortgrasses	approx. 5%	bare soil (n=8)	9% (4 - 18)
- half-shrubs	approx. 5%		
- forbs	approx. 10%		

**SPECIES COMPOSITION (% biomass, n=12)**

<b>Major short shrubs</b>		<b>Major graminoids</b>	
western snowberry ( <i>Symphoricarpos occidentalis</i> )	3% (0 - 7)	crested wheat-grass ( <i>Agropyron cristatum</i> )	50% (17 - 77)
rose ( <i>Rosa spp.</i> )	1% (0 - 4)	needle-and-thread ( <i>Hesperostipa comata</i> )	5% (0 - 17)
silver sagebrush ( <i>Artemisia cana</i> )	1% (0 - 3)	blue grama ( <i>Bouteloua gracilis</i> )	3% (0 - 9)
		sedge ( <i>Carex spp.</i> )	3% (0 - 5)
<b>Major forbs and half-shrubs</b>		Canada blue-grass ( <i>Poa compressa</i> )	2% (0 - 0)
sweetclover ( <i>Melilotus spp.</i> )	7% (0 - 0)	alkali grass ( <i>Puccinellia nuttalliana</i> )	2% (0 - 0)
pasture sage ( <i>Artemisia frigida</i> )	5% (0 - 12)	western porcupine-grass ( <i>Hesperostipa curtisetata</i> )	1% (0 - 0)
prairie sage ( <i>Artemisia ludoviciana</i> )	2% (0 - 3)	western wheat-grass ( <i>Pascopyrum smithii</i> )	1% (0 - 2)
silver-leaved psoralea ( <i>Pediomelum argophyllum</i> )	1% (0 - 2)	salt grass ( <i>Distichlis spicata var. stricta</i> )	1% (0 - 0)
lance-leaved psoralea ( <i>Psoralidium lanceolatum</i> )	1% (0 - 4)	june grass ( <i>Koeleria macrantha</i> )	1% (0 - 3)
goldenrod ( <i>Solidago spp.</i> )	1% (0 - 3)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	1% (0 - 2)
golden bean ( <i>Thermopsis rhombifolia</i> )	1% (0 - 1)	smooth brome ( <i>Bromus inermis</i> )	1% (0 - 2)
yellow coneflower ( <i>Ratibida columnifera</i> )	1% (0 - 1)	sand dropseed ( <i>Sporobolus cryptandrus</i> )	1% (0 - 3)
<b>Minor graminoids</b>	1%		
<b>Minor forbs and half-shrubs</b>	3%		

<b>SIMILARITY TO REFERENCE COMMUNITY (MG-SD-B)</b>	27%
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<b>PRODUCTION</b>	insufficient data
<b>RECOMMENDED STOCKING RATE</b>	insufficient data

MG-SD-F

**Creeping Juniper / Sedge – Sand Grass**  
Mixed Grassland and Dry Mixed Grassland: Sand Ecosite

**GENERAL DESCRIPTION:** Prostrate shrub stands on the Sand Ecosite in the Mixed Grassland and Dry Mixed Grassland Ecoregions. These stands tend to be found on somewhat less stable areas within the Sand Ecosite. However, disturbance by fire kills the juniper mat, resulting in increased grass growth. The sampled plots were generally grazed, and the status of this community with respect to grazing is unknown. The community provides little grazing capacity for livestock, but is an important source of winter browse for wild ungulates.

**STRUCTURE** (n=17)

short shrub cover	2% (0 - 3)	clubmoss cover	0% (0 - 1)
prostrate shrub cover	39% (24 - 68)	moss cover	0% (0 - 1)
herbaceous cover	10% (3 - 13)		

**SPECIES COMPOSITION** (n=17)

<b>Major short shrubs</b> (% foliar cover)		<b>Major graminoids</b> (% biomass)	
western snowberry ( <i>Symphoricarpos occidentalis</i> )	1% (0 - 3)	sun-loving sedge ( <i>Carex inops</i> )	15% (0 - 37)
<b>Major prostrate shrubs</b> (% foliar cover)		sand-grass ( <i>Calamovilfa longifolia</i> )	10% (0 - 31)
creeping juniper ( <i>Juniperus horizontalis</i> )	38% (23 - 68)	June grass ( <i>Koeleria macrantha</i> )	9% (1 - 23)
common bearberry ( <i>Arctostaphylos uva-ursi</i> )	2% (0 - 3)	blunt sedge ( <i>Carex obtusata</i> )	8% (0 - 25)
<b>Major forbs and half-shrubs</b> (% biomass)		graceful sedge ( <i>Carex praegracilis</i> )	6% (0 - 19)
pasture sage ( <i>Artemisia frigida</i> )	4% (0 - 9)	Baltic rush ( <i>Juncus arcticus</i> var. <i>balticus</i> )	5% (0 - 16)
Missouri goldenrod ( <i>Solidago missouriensis</i> )	2% (0 - 7)	needle-and-thread ( <i>Hesperostipa comata</i> )	5% (0 - 12)
lance-leaved psoralea ( <i>Psoraleidium lanceolatum</i> )	1% (0 - 0)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	5% (0 - 13)
American wild licorice ( <i>Glycyrrhiza lepidota</i> )	1% (0 - 4)	western wheat-grass ( <i>Pascopyrum smithii</i> )	5% (0 - 17)
milk-vetch ( <i>Astragalus</i> spp.)	1% (0 - 1)	awned wheat-grass ( <i>Elymus trachycaulus</i> ssp. <i>subsecundus</i> )	4% (0 - 14)
golden bean ( <i>Thermopsis rhombifolia</i> )	1% (0 - 3)	northern reed-grass ( <i>Calamagrostis stricta</i> ssp. <i>inexpansa</i> )	4% (0 - 11)
field chickweed ( <i>Cerastium arvense</i> )	1% (0 - 2)	little bluestem ( <i>Schizachyrium scoparium</i> )	3% (0 - 4)
prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 1)	plains reed-grass ( <i>Calamagrostis montanensis</i> )	2% (0 - 9)
<b>Minor short shrubs</b> (% foliar cover)	1%	low sedge ( <i>Carex duriuscula</i> )	2% (0 - 4)
<b>Minor graminoids</b> (% biomass)	1%	mat muhly ( <i>Muhlenbergia richardsonis</i> )	1% (0 - 1)
<b>Minor forbs</b> (% biomass)	3%	smooth brome ( <i>Bromus inermis</i> )	1% (0 - 0)
<b>REC. STOCKING RATE</b>	none to low	Rocky Mountain fescue ( <i>Festuca saximontana</i> )	1% (0 - 3)
		Sandberg's blue-grass ( <i>Poa secunda</i> ssp. <i>secunda</i> )	1% (0 - 1)
		alkali cord-grass ( <i>Spartina gracilis</i> )	1% (0 - 1)
		blue-grass ( <i>Poa</i> spp.)	1% (0 - 1)

MG-SD-G

**Rose – Snowberry / Sand Grass – Needle-and-thread – Pasture Sage**

Mixed Grassland and Dry Mixed Grassland: Sand Ecosite

**GENERAL DESCRIPTION:** The most common short shrub type on the Sand Ecosite in the Mixed Grassland and Dry Mixed Grassland Ecoregions. Stands vary from rose-snowberry mixtures to pure snowberry. This community increases in the absence of fire, whereas repeated fire shifts the community back to grassland. The status of this community with respect to grazing impact is not clear.

**STRUCTURE (n=9)**

tree cover	0% (0 - 1)	cactus cover	0% (0 - 1)
tall shrub cover	1% (0 - 1)	herbaceous cover	22% (11 - 36)
short shrub cover	28% (18 - 39)	moss cover	5% (0 - 12)

**SPECIES COMPOSITION (n=9)**

<b>Major trees</b> (% foliar cover)		<b>Major graminoids</b> (% biomass)	
balsam poplar ( <i>Populus balsamifera</i> )	1% (0 - 1)	sand grass ( <i>Calamovilfa longifolia</i> )	14% (0 - 44)
		needle-and-thread ( <i>Hesperostipa comata</i> )	12% (0 - 25)
<b>Major short shrubs</b> (% foliar cover)		graceful sedge ( <i>Carex praeegracilis</i> )	5% (0 - 17)
rose ( <i>Rosa</i> spp.)	14% (6 - 28)	blue-grass ( <i>Poa</i> spp.)	4% (0 - 8)
western snowberry ( <i>Symphoricarpos occidentalis</i> )	13% (0 - 25)	sun-loving sedge ( <i>Carex inops</i> )	4% (0 - 17)
wolf-willow ( <i>Elaeagnus commutata</i> )	1% (0 - 4)	low sedge ( <i>Carex duriuscula</i> )	4% (0 - 10)
		slender wheat-grass ( <i>Elymus tra. ssp. trachycaulus</i> )	3% (0 - 9)
<b>Major forbs and half-shrubs</b> (% biomass)		sand dropseed ( <i>Sporobolus cryptandrus</i> )	2% (0 - 6)
pasture sage ( <i>Artemisia frigida</i> )	15% (5 - 25)	June grass ( <i>Koeleria macrantha</i> )	2% (0 - 6)
Missouri goldenrod ( <i>Solidago missouriensis</i> )	9% (0 - 29)	blue grama ( <i>Bouteloua gracilis</i> )	2% (0 - 8)
lance-leaved psoralea ( <i>Psoraleidium lanceolatum</i> )	5% (0 - 16)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	2% (0 - 6)
American wild licorice ( <i>Glycyrrhiza lepidota</i> )	4% (0 - 8)	Canada wild-rye ( <i>Elymus canadensis</i> )	2% (0 - 3)
yellow goat's-beard ( <i>Tragopogon dubius</i> )	2% (0 - 3)	awned wheat-grass ( <i>Elymus tra. ssp. subsecundus</i> )	1% (0 - 5)
narrow-leaved goosefoot ( <i>Chenopodium leptophyllum</i> )	1% (0 - 4)	blunt sedge ( <i>Carex obtusata</i> )	1% (0 - 2)
sow-thistle ( <i>Sonchus</i> spp.)	1% (0 - 2)	Douglas' sedge ( <i>Carex douglasii</i> )	1% (0 - 3)
biennial wormwood ( <i>Artemisia biennis</i> )	1% (0 - 2)	western wheat-grass ( <i>Pascopyrum smithii</i> )	1% (0 - 3)
<b>Minor graminoids</b> (% biomass)	1%	<b>Minor forbs, half-shrubs</b> (% biomass)	2%

**SIMILARITY TO REFERENCE COMMUNITY** unknown

**RECOMMENDED STOCKING RATE** 0.34 AUM/ha 0.14 AUM/ac



DMG-SD-H

**Aspen / Creeping Juniper / Awned Wheat-grass – Wild Licorice**

**Dry Mixed Grassland: Sand Ecosite**

**GENERAL DESCRIPTION:** Short, open aspen stands on the Sand Ecosite in the Dry Mixed Grassland Ecoregion. These stands are usually found on slightly moister microsites, and may be somewhat subirrigated. The sampled plots were generally grazed, and it is not known whether stands with less grazing pressure might have better developed erect shrub layers (e.g. choke-cherry, saskatoon). The community provides little grazing capacity for livestock and wild ungulates, but may provide shade and/or hiding cover.

This description is based on plots in the Dry Mixed Grassland. Stands in the Mixed Grassland can be represented by the type described for the Dunes Ecosite in the Mixed Grassland (MG-DN-F Aspen / Choke-cherry / Snowberry / Sedge).

**STRUCTURE (n=10)**

tree cover	17% (9 - 25)	prostrate shrub cover	11% (0 - 22)
tall shrub cover (incl. aspen saplings)	8% (0 - 18)	herbaceous cover	11% (4 - 18)
short shrub cover	9% (3 - 15)		

**SPECIES COMPOSITION (n=10)**

<b>Major trees</b> (% foliar cover)		<b>Major tall shrubs</b> (% foliar cover)	
trembling aspen ( <i>Populus tremuloides</i> )	17% (9 - 24)	peach-leaf willow ( <i>Salix amygdaloides</i> )	1% (0 - 1)
<b>Major short shrubs</b> (% foliar cover)		<b>Major prostrate shrubs</b> (% foliar cover)	
western snowberry ( <i>Symphoricarpos occidentalis</i> )	3% (0 - 5)	creeping juniper ( <i>Juniperus horizontalis</i> )	10% (0 - 22)
rose ( <i>Rosa</i> spp.)	2% (0 - 6)	common bearberry ( <i>Arctostaphylos uva-ursi</i> )	1% (0 - 2)
wolf-willow ( <i>Elaeagnus commutata</i> )	1% (0 - 2)	<b>Major forbs and half-shrubs</b> (% biomass)	
<b>Major graminoids</b> (% biomass)		wild licorice ( <i>Glycyrrhiza lepidota</i> )	21% (0 - 41)
awned wheat-grass ( <i>Elymus trachycaulus</i> ssp. <i>subsecundus</i> )	11% (0 - 34)	Missouri goldenrod ( <i>Solidago missouriensis</i> )	6% (0 - 12)
sand-grass ( <i>Calamovilfa longifolia</i> )	7% (0 - 28)	Fremont's goosefoot ( <i>Chenopodium fremontii</i> )	6% (0 - 6)
northern wheat-grass ( <i>Elymus lanceolatus</i> )	7% (0 - 19)	lance-leaved psoralea ( <i>Psoraleidium lanceolatum</i> )	4% (0 - 11)
sun-loving sedge ( <i>Carex inops</i> )	6% (0 - 15)	narrow-leaved American vetch ( <i>Vicia americana</i> ssp. <i>minor</i> )	2% (0 - 10)
slender wheat-grass ( <i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i> )	4% (0 - 8)	blunt-leaved sandwort ( <i>Moehringia lateriflora</i> )	2% (0 - 2)
Rocky Mountain fescue ( <i>Festuca saximontana</i> )	3% (0 - 6)	pasture sage ( <i>Artemisia frigida</i> )	2% (0 - 5)
June grass ( <i>Koeleria macrantha</i> )	3% (0 - 9)	prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 2)
graceful sedge ( <i>Carex praegracilis</i> )	2% (0 - 6)	pussytoes ( <i>Antennaria</i> spp.)	1% (0 - 0)
Douglas' sedge ( <i>Carex douglasii</i> )	2% (0 - 2)	smooth scouring-rush ( <i>Equisetum laevigatum</i> )	1% (0 - 1)
northern reed-grass ( <i>Calamagrostis stricta</i> ssp. <i>inexpansa</i> )	2% (0 - 2)	narrow-leaved puccoon ( <i>Lithospermum incisum</i> )	1% (0 - 2)

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mat muhly ( <i>Muhlenbergia richardsonis</i> )	2% (0 - 2)
blunt sedge ( <i>Carex obtusata</i> )	2% (0 - 7)
low sedge ( <i>Carex duriuscula</i> )	1% (0 - 4)
western wheat-grass ( <i>Pascopyrum smithii</i> )	1% (0 - 2)
plains reed-grass ( <i>Calamagrostis montanensis</i> )	1% (0 - 2)
Baltic rush ( <i>Juncus arcticus</i> var. <i>balticus</i> )	1% (0 - 1)
Kentucky blue-grass ( <i>Poa pratensis</i> )	1% (0 - 1)

<b>Minor tall shrubs</b> (% foliar cover)	0%
<b>Minor short shrubs</b> (% foliar cover)	0%
<b>Minor graminoids</b> (% biomass)	1%
<b>Minor forbs and half-shrubs</b> (% biomass)	2%

<b>SIMILARITY TO REFERENCE COMMUNITY</b>	unknown
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<b>RECOMMENDED STOCKING RATE</b>	none to low
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AP-SD-A

**Western Porcupine Grass**  
Aspen Parkland: Sand and Sandy Loam Ecosites

**STRUCTURE**

herbaceous cover (n=11)	32% (17 - 45)	clubmoss cover (n=11)	22% (0 - 54)
- midgrasses	approx. 20%	litter cover (n=8)	44% (28 - 68)
- shortgrasses	approx. 10%	bare soil (n=8)	5% (1 - 10)
- half-shrubs	approx. 1%		
- forbs	approx. 2%		

**SPECIES COMPOSITION (% biomass, n=14)**

<b>Major graminoids</b>		<b>Major short shrubs</b>	
western porcupine-grass ( <i>Hesperostipa curtisetata</i> )	38% (7 - 64)	western snowberry ( <i>Symphoricarpos occidentalis</i> )	2% (0 - 4)
sedge ( <i>Carex spp.</i> )	12% (1 - 20)	rose ( <i>Rosa spp.</i> )	1% (0 - 3)
needle-and-thread ( <i>Hesperostipa comata</i> )	9% (0 - 13)		
northern wheat-grass ( <i>Elymus lanceolatus</i> )	5% (0 - 13)	<b>Major forbs and half-shrubs</b>	
plains rough fescue ( <i>Festuca altaica var. hallii</i> )	4% (0 - 18)	pasture sage ( <i>Artemisia frigida</i> )	3% (1 - 7)
june grass ( <i>Koeleria macrantha</i> )	4% (0 - 11)	crocus anemone ( <i>Pulsatilla patens</i> )	2% (0 - 5)
blue grama ( <i>Bouteloua gracilis</i> )	4% (0 - 8)	cinquefoil ( <i>Potentilla spp.</i> )	1% (0 - 2)
Hooker's oat-grass ( <i>Avenula hookeri</i> )	3% (0 - 6)	goldenrod ( <i>Solidago spp.</i> )	1% (0 - 2)
sand grass ( <i>Calamovilfa longifolia</i> )	3% (0 - 2)	prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 2)
plains muhly ( <i>Muhlenbergia cuspidata</i> )	2% (0 - 6)	hairy golden-aster ( <i>Heterotheca villosa</i> )	1% (0 - 2)
western wheat-grass ( <i>Pascopyrum smithii</i> )	1% (0 - 3)		
awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	1% (0 - 5)	<b>Minor graminoids</b> 1%	
mat muhly ( <i>Muhlenbergia richardsonis</i> )	1% (0 - 0)	<b>Minor forbs and half-shrubs</b> 3%	
Canada blue-grass ( <i>Poa compressa</i> )	1% (0 - 1)		

<b>SIMILARITY TO REFERENCE COMMUNITY</b>	reference community
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<b>PRODUCTION</b>	insufficient data	
<b>RECOMMENDED STOCKING RATE</b>		
Drier part of region	1.05 AUM/ha	0.43 AUM/ac
Moister part of region	1.60 AUM/ha	0.65 AUM/ac

AP-SD-B

**Western Porcupine Grass – Sedge**  
Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Mixed prairie dominated by midgrasses, but with shortgrasses subdominant. Lesser amounts of forbs and half-shrubs. Shrub cover usually low. Interpreted as showing **minor alteration** from the reference community as a result of grazing impact. Probably develops from the reference community (AP-SD-A) by decrease in western porcupine-grass and increase in a variety of species.

**STRUCTURE**

herbaceous cover (n=6)	34% (24 - 42)	- midgrasses	approx. 15%
clubmoss cover (n=6)	34% (9 - 66)	- shortgrasses	approx. 10%
litter cover (n=6)	38% (21 - 58)	- half-shrubs	approx. 2%
bare soil (n=6)	4% (0 - 8)	- forbs	approx. 5%

**SPECIES COMPOSITION** (% biomass, n=25)

<b>Major short shrubs</b>		<b>Major prostrate shrubs</b>	
rose ( <i>Rosa spp.</i> )	1% (0 - 4)	creeping juniper ( <i>Juniperus horizontalis</i> )	2% (0 - 0)
<b>Major forbs and half-shrubs</b>		<b>Major graminoids</b>	
pasture sage ( <i>Artemisia frigida</i> )	5% (0 - 12)	western porcupine-grass ( <i>Hesperostipa curtiseta</i> )	21% (14 - 32)
field chickweed ( <i>Cerastium arvense</i> )	1% (0 - 4)	sedge ( <i>Carex spp.</i> )	14% (6 - 21)
crocus anemone ( <i>Pulsatilla patens</i> )	1% (0 - 3)	blue grama ( <i>Bouteloua gracilis</i> )	6% (0 - 16)
pale comandra ( <i>Comandra umbellata</i> )	1% (0 - 2)	june grass ( <i>Koeleria macrantha</i> )	6% (0 - 13)
everlasting ( <i>Antennaria spp.</i> )	1% (0 - 0)	needle-and-thread ( <i>Hesperostipa comata</i> )	3% (0 - 11)
northern bedstraw ( <i>Galium boreale</i> )	1% (0 - 3)	Kentucky blue-grass ( <i>Poa pratensis</i> )	3% (0 - 9)
hairy golden-aster ( <i>Heterotheca villosa</i> )	1% (0 - 5)	Rocky Mountain fescue ( <i>Festuca saximontana</i> )	3% (0 - 8)
goldenrod ( <i>Solidago spp.</i> )	1% (0 - 3)	sand grass ( <i>Calamovilfa longifolia</i> )	3% (0 - 9)
sunflower ( <i>Helianthus spp.</i> )	1% (0 - 1)	Hooker's oat-grass ( <i>Avenula hookeri</i> )	3% (0 - 7)
prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 2)	western wheat-grass ( <i>Pascopyrum smithii</i> )	2% (0 - 8)
purple prairie-clover ( <i>Petalostemon purpureum</i> )	1% (0 - 2)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	2% (0 - 7)
three-flowered avens ( <i>Geum triflorum</i> )	1% (0 - 3)	plains rough fescue ( <i>Festuca altaica</i> var. <i>hallii</i> )	1% (0 - 4)
chamaerhodos ( <i>Chamaerhodos erecta</i> )	1% (0 - 2)	awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	1% (0 - 4)
white cinquefoil ( <i>Potentilla arguta</i> )	1% (0 - 1)	common witch-grass ( <i>Panicum capillare</i> )	1% (0 - 6)
anemone ( <i>Anemone spp.</i> )	1% (0 - 0)	plains muhly ( <i>Muhlenbergia cuspidata</i> )	1% (0 - 3)
harebell ( <i>Campanula rotundifolia</i> )	1% (0 - 2)	crested wheat-grass ( <i>Agropyron cristatum</i> )	1% (0 - 0)
<b>Minor graminoids</b>	2%	green needle grass ( <i>Nassella viridula</i> )	1% (0 - 0)
<b>Minor forbs and half-shrubs</b>	5%	timber oat-grass ( <i>Danthonia intermedia</i> )	1% (0 - 0)

<b>SIMILARITY TO REFERENCE COMMUNITY</b>		66%
<b>PRODUCTION</b>	insufficient data	
<b>RECOMMENDED STOCKING RATE</b>		
Drier part of region	1.05 AUM/ha	0.43 AUM/ac
Moister part of region	1.60 AUM/ha	0.65 AUM/ac

AP-SD-C

**Sedge - Western Porcupine-grass - June Grass**

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Mixed prairie with shortgrasses and midgrasses codominant, with lesser components of forbs and half-shrubs. Shrub cover usually low. Interpreted as showing **moderate alteration** from the reference community as a result of grazing impact. Probably develops from AP-SD-B by decrease of western porcupine-grass and increase of sedges and june grass.

**STRUCTURE**

herbaceous cover (n=11)	65% (36 - 83)	- midgrasses	approx. 25%
clubmoss cover (n=11)	29% (15 - 45)	- shortgrasses	approx. 25%
litter cover (n=10)	30% (17 - 45)	- half-shrubs	approx. 5%
bare soil (n=10)	3% (1 - 5)	- forbs	approx. 10%

**SPECIES COMPOSITION** (% biomass, n=20)

<b>Major short shrubs</b>		<b>Major graminoids</b>	
western snowberry ( <i>Symphoricarpos occidentalis</i> )	2% (0 - 8)	sedge ( <i>Carex spp.</i> )	20% (8 - 31)
rose ( <i>Rosa spp.</i> )	1% (0 - 4)	western porcupine-grass ( <i>Hesperostipa curtiseta</i> )	10% (2 - 16)
<b>Major prostrate shrubs</b>		june grass ( <i>Koeleria macrantha</i> )	10% (0 - 18)
creeping juniper ( <i>Juniperus horizontalis</i> )	1% (0 - 0)	needle-and-thread ( <i>Hesperostipa comata</i> )	7% (0 - 15)
<b>Major forbs and half-shrubs</b>		sand grass ( <i>Calamovilfa longifolia</i> )	5% (0 - 14)
pasture sage ( <i>Artemisia frigida</i> )	7% (0 - 16)	western wheat-grass ( <i>Pascopyrum smithii</i> )	4% (0 - 10)
goldenrod ( <i>Solidago spp.</i> )	1% (0 - 3)	Hooker's oat-grass ( <i>Avenula hookeri</i> )	3% (0 - 10)
field chickweed ( <i>Cerastium arvense</i> )	1% (0 - 5)	blue grama ( <i>Bouteloua gracilis</i> )	3% (0 - 9)
hairy golden-aster ( <i>Heterotheca villosa</i> )	1% (0 - 5)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	2% (0 - 7)
harebell ( <i>Campanula rotundifolia</i> )	1% (0 - 3)	common witch-grass ( <i>Panicum capillare</i> )	2% (0 - 10)
crocus anemone ( <i>Pulsatilla patens</i> )	1% (0 - 3)	Kentucky blue-grass ( <i>Poa pratensis</i> )	2% (0 - 7)
three-flowered avens ( <i>Geum triflorum</i> )	1% (0 - 2)	Rocky Mountain fescue ( <i>Festuca saximontana</i> )	2% (0 - 5)
pale comandra ( <i>Comandra umbellata</i> )	1% (0 - 2)	awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	1% (0 - 5)
prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 2)	plains reed grass ( <i>Calamagrostis montanensis</i> )	1% (0 - 1)
dotted blazingstar ( <i>Liatris punctata</i> )	1% (0 - 3)	baltic rush ( <i>Juncus arcticus var. balticus</i> )	1% (0 - 2)
<b>Minor graminoids</b>	2%	plains rough fescue ( <i>Festuca altaica var. hallii</i> )	1% (0 - 0)
<b>Minor forbs and half-shrubs</b>	6%	Nuttall's alkali grass ( <i>Puccinellia nuttalliana</i> )	1% (0 - 0)

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<b>SIMILARITY TO REFERENCE COMMUNITY</b>	58%
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<b>RECOMMENDED STOCKING RATE</b>		
Drier part of region	0.84 AUM/ha	0.34 AUM/ac
Moister part of region	1.28 AUM/ha	0.52 AUM/ac

AP-SD-D

**Needle-and-thread - June Grass**

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Mixed prairie dominated by midgrasses, but with a significant component of shortgrasses, and lesser components of half-shrubs and forbs. Often with significant patches of short shrubs. Interpreted as showing **moderate alteration** from the reference community as a result of grazing impact. Probably develops from the reference community (AP-SD-A) by decrease of western porcupine-grass and increase of needle-and-thread, pasture sage, and june grass.

**STRUCTURE - insufficient data**

**SPECIES COMPOSITION (% biomass, n=20)**

**Major short shrubs**

western snowberry ( <i>Symphoricarpos occidentalis</i> )	5% (0 - 12)
rose ( <i>Rosa spp.</i> )	1% (0 - 5)

**Major forbs and half-shrubs**

pasture sage ( <i>Artemisia frigida</i> )	13% (4 - 23)
crocus anemone ( <i>Pulsatilla patens</i> )	2% (0 - 7)
goldenrod ( <i>Solidago spp.</i> )	1% (0 - 3)
three-flowered avens ( <i>Geum triflorum</i> )	1% (0 - 4)
woolly yarrow ( <i>Achillea millefolium</i> )	1% (0 - 2)
golden bean ( <i>Thermopsis rhombifolia</i> )	1% (0 - 2)

**Minor graminoids** 2%

**Minor forbs and half-shrubs** 5%

**Major graminoids**

needle-and-thread ( <i>Hesperostipa comata</i> )	25% (16 - 34)
june grass ( <i>Koeleria macrantha</i> )	10% (3 - 18)
sedge ( <i>Carex spp.</i> )	9% (4 - 17)
northern wheat-grass ( <i>Elymus lanceolatus</i> )	5% (0 - 21)
western porcupine-grass ( <i>Hesperostipa curtisetata</i> )	4% (0 - 10)
western wheat-grass ( <i>Pascopyrum smithii</i> )	3% (0 - 14)
Kentucky blue-grass ( <i>Poa pratensis</i> )	2% (0 - 9)
sand grass ( <i>Calamovilfa longifolia</i> )	2% (0 - 9)
plains reed grass ( <i>Calamagrostis montanensis</i> )	2% (0 - 6)
blue grama ( <i>Bouteloua gracilis</i> )	1% (0 - 4)
Sandberg's blue-grass ( <i>Poa secunda</i> )	1% (0 - 4)
Nuttall's alkali grass ( <i>Puccinellia nuttalliana</i> )	1% (0 - 3)
redtop ( <i>Agrostis stolonifera</i> )	1% (0 - 1)
Rocky Mountain fescue ( <i>Festuca saximontana</i> )	1% (0 - 5)
timber oat-grass ( <i>Danthonia intermedia</i> )	1% (0 - 0)

**SIMILARITY TO REFERENCE COMMUNITY**

48%

**PRODUCTION**

insufficient data

**RECOMMENDED STOCKING RATE**

Drier part of region	0.84 AUM/ha	0.34 AUM/ac
Moister part of region	1.28 AUM/ha	0.52 AUM/ac

AP-SD-E

**Pasture Sage - Sedge - Needle-and-thread - June Grass**

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Mixed prairie dominated by shortgrasses, but with a significant component of midgrasses, and lesser components of half-shrubs and forbs. Shrub cover usually low. Interpreted as showing **significant alteration** from the reference community as a result of heavy grazing impact. May develop from AP-SD-C by decrease of western porcupine-grass and increase of pasture sage. May also develop from AP-SD-D by decrease of needle-and-thread and increase of pasture sage and sedges.

**STRUCTURE**

herbaceous cover (n=7)	58% (38 - 73)	- midgrasses	approx. 15%
clubmoss cover (n=5)	18% (5 - 31)	- shortgrasses	approx. 20%
litter cover (n=6)	29% (11 - 47)	- half-shrubs	approx. 10%
bare soil (n=6)	11% (2 - 21)	- forbs	approx. 10%

**SPECIES COMPOSITION (% biomass, n=20)**

<b>Major short shrubs</b>		<b>Major graminoids</b>	
rose ( <i>Rosa spp.</i> )	3% (0 - 8)	sedge ( <i>Carex spp.</i> )	16% (3 - 28)
western snowberry ( <i>Symphoricarpos occidentalis</i> )	1% (0 - 2)	needle-and-thread ( <i>Hesperostipa comata</i> )	12% (0 - 24)
<b>Major forbs and half-shrubs</b>		june grass ( <i>Koeleria macrantha</i> )	10% (1 - 22)
pasture sage ( <i>Artemisia frigida</i> )	17% (1 - 41)	blue grama ( <i>Bouteloua gracilis</i> )	5% (0 - 13)
goldenrod ( <i>Solidago spp.</i> )	1% (0 - 4)	Kentucky blue-grass ( <i>Poa pratensis</i> )	5% (0 - 12)
field chickweed ( <i>Cerastium arvense</i> )	1% (0 - 6)	western wheat-grass ( <i>Pascopyrum smithii</i> )	4% (0 - 12)
three-flowered avens ( <i>Geum triflorum</i> )	1% (0 - 4)	western porcupine-grass ( <i>Hesperostipa curtiseta</i> )	3% (0 - 9)
hairy golden-aster ( <i>Heterotheca villosa</i> )	1% (0 - 2)	northern wheat-grass ( <i>Elymus lanceolatus</i> )	2% (0 - 4)
golden bean ( <i>Thermopsis rhombifolia</i> )	1% (0 - 1)	sand grass ( <i>Calamovilfa longifolia</i> )	1% (0 - 4)
showy milkweed ( <i>Asclepias speciosa</i> )	1% (0 - 0)	Rocky Mountain fescue ( <i>Festuca saximontana</i> )	1% (0 - 4)
horsetail ( <i>Equisetum spp.</i> )	1% (0 - 1)	Hooker's oat-grass ( <i>Avenula hookeri</i> )	1% (0 - 2)
woolly yarrow ( <i>Achillea millefolium</i> )	1% (0 - 1)	common witch-grass ( <i>Panicum capillare</i> )	1% (0 - 0)
		<b>Minor graminoids</b>	3%
		<b>Minor forbs and half-shrubs</b>	10%

**SIMILARITY TO REFERENCE COMMUNITY** 46%

<b>RECOMMENDED STOCKING RATE</b>		
Drier part of region	0.63 AUM/ha	0.26 AUM/ac
Moister part of region	0.96 AUM/ha	0.39 AUM/ac

AP-SD-F

**Crested Wheat-grass – Sedge**

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Grassland dominated by exotic midgrasses, with lesser components of native grasses, forbs, and half-shrubs. May have significant patches of short shrubs. Interpreted as showing **significant alteration** from the reference community as a result of exotic invasion. However, may include some old seeded stands that have been reinvaded by native species.

**STRUCTURE – no information**

**SPECIES COMPOSITION (% biomass, n=7)**

<b>Major short shrubs</b>	
western snowberry ( <i>Symphoricarpos occidentalis</i> )	4% (0 - 8)
rose ( <i>Rosa spp.</i> )	4% (0 - 11)

<b>Major forbs and half-shrubs</b>	
pasture sage ( <i>Artemisia frigida</i> )	9% (3 - 18)
hairy golden-aster ( <i>Heterotheca villosa</i> )	4% (0 - 10)
goldenrod ( <i>Solidago spp.</i> )	2% (0 - 6)
golden bean ( <i>Thermopsis rhombifolia</i> )	2% (0 - 5)
many-flowered aster ( <i>Symphyotrichum ericoides</i> var. <i>pansum</i> )	1% (0 - 3)
prairie sage ( <i>Artemisia ludoviciana</i> )	1% (0 - 3)
wild licorice ( <i>Glycyrrhiza lepidota</i> )	1% (0 - 3)
gumweed ( <i>Grindelia squarrosa</i> )	1% (0 - 3)
three-flowered avens ( <i>Geum triflorum</i> )	1% (0 - 2)
yellow coneflower ( <i>Ratibida columnifera</i> )	1% (0 - 2)

<b>Major graminoids</b>	
crested wheat-grass ( <i>Agropyron cristatum</i> )	22% (12 - 31)
sedge ( <i>Carex spp.</i> )	10% (2 - 17)
june grass ( <i>Koeleria macrantha</i> )	7% (1 - 15)
needle-and-thread ( <i>Hesperostipa comata</i> )	6% (0 - 17)
Canada wild rye ( <i>Elymus canadensis</i> )	4% (0 - 10)
Kentucky blue-grass ( <i>Poa pratensis</i> )	4% (0 - 10)
northern wheat-grass ( <i>Elymus lanceolatus</i> )	3% (0 - 8)
Sandberg's blue-grass ( <i>Poa secunda</i> )	3% (0 - 7)
smooth brome ( <i>Bromus inermis</i> )	2% (0 - 5)
western wheat-grass ( <i>Pascopyrum smithii</i> )	2% (0 - 6)
blue grama ( <i>Bouteloua gracilis</i> )	1% (0 - 5)
western porcupine-grass ( <i>Hesperostipa curtisetata</i> )	1% (0 - 4)
Hooker's oat-grass ( <i>Avenula hookeri</i> )	1% (0 - 3)
awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	1% (0 - 2)

<b>Minor graminoids</b>	1%
<b>Minor forbs and half-shrubs</b>	3%

<b>SIMILARITY TO REFERENCE COMMUNITY</b>	39%
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<b>PRODUCTION</b>	insufficient data
<b>RECOMMENDED STOCKING RATE</b>	insufficient data



AP-SD-G

Aspen / Choke-cherry - Saskatoon / Rose - Snowberry / Sedge

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Reference community for aspen stands on sandy soils in the Aspen Parkland. Both ungrazed and lightly grazed plots were used in describing this community. Note that this community includes Kentucky blue-grass, which is exotic, as a major species. Stands that are totally free of exotics are hard to find in the Aspen Parkland, so this should be regarded as a realistic reference community, rather than an ideal one. This community, especially in open aspen stands, combines high grass production with significant yield from palatable shrubs and forbs, so recommended stocking rates are higher than for other forest types. Recommended stocking rates are based on average yields in open stands of this community; rates for closed stands are estimated.

This community was originally described by Thorpe and Godwin (2008).

STRUCTURE

tree cover (n=13)	48% (38 – 63)
tall shrub cover (n=16)	26% (7 – 56)
short shrub cover (n=16)	19% (2 – 35)
prostrate shrub cover (n=16)	1% (0 – 4)
herbaceous cover (n=16)	23% (1 – 50)

moss cover (n=8)	2% (0 – 6)
LFH thickness (n=7)	2 cm (0 – 3)
litter cover (n=5)	74% (56 – 93)
bare soil (n=8)	0% (0 – 0)

SPECIES COMPOSITION (% foliar cover)

<b>Major trees (n=13)</b>	
trembling aspen ( <i>Populus tremuloides</i> )	48% (38 - 63)

<b>Major tall shrubs (n=16)</b>	
choke-cherry ( <i>Prunus virginiana</i> )	12% (1 - 26)
saskatoon ( <i>Amelanchier alnifolia</i> )	11% (0 - 23)
pincherry ( <i>Prunus pensylvanica</i> )	3% (0 - 15)
beaked hazelnut ( <i>Corylus cornuta</i> )	2% (0 - 8)
twining honeysuckle ( <i>Lonicera dioica</i> )	1% (0 - 3)

<b>Major short shrubs (n=16)</b>	
rose ( <i>Rosa</i> spp.)	8% (1 - 15)
snowberry ( <i>Symphoricarpos</i> spp.)	6% (0 - 15)
wild red raspberry ( <i>Rubus idaeus</i> )	1% (0 - 0)

<b>Major prostrate shrubs (n=16)</b>	
bearberry ( <i>Arctostaphylos uva-ursi</i> )	1% (0 - 3)

<b>Major graminoids (n=16)</b>	
sedge ( <i>Carex siccata</i> , <i>C. obtusata</i> )	5% (0 - 13)
Kentucky blue-grass ( <i>Poa pratensis</i> )	2% (0 - 6)
purple oat-grass ( <i>Schizachne purpurascens</i> )	2% (0 - 7)
rough-leaved rice-grass ( <i>Oryzopsis asperifolia</i> )	1% (0 - 2)
Hooker's oat-grass ( <i>Avenula hookeri</i> )	1% (0 - 2)

<b>Major forbs (n=16)</b>	
vetchling ( <i>Lathyrus</i> spp.)	2% (0 - 5)
northern bedstraw ( <i>Galium boreale</i> )	2% (0 - 4)
wild sarsaparilla ( <i>Aralia nudicaulis</i> )	1% (0 - 1)
star-flowered solomon's-seal ( <i>Maianthemum stellatum</i> )	1% (0 - 2)
golden bean ( <i>Thermopsis rhombifolia</i> )	1% (0 - 2)
two-leaved solomon's seal ( <i>Maianthemum canadense</i> )	1% (0 - 2)
veiny meadow-rue ( <i>Thalictrum venulosum</i> )	1% (0 - 2)
American vetch ( <i>Vicia americana</i> )	1% (0 - 1)

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<b>Minor graminoids (n=16)</b>	1%
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<b>Minor forbs and prostrate shrubs (n=16)</b>	2%
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<b>SIMILARITY TO REFERENCE COMMUNITY</b>	ref. comm.
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<b>RECOMMENDED STOCKING RATES</b>		
closed stands (>50% canopy closure)	(0.71 AUM/ha)	(0.29 AUM/ac)
open stands (<50% canopy closure)	1.05 AUM/ha	0.43 AUM/ac



AP-SD-H

Aspen / Choke-cherry / Snowberry – Rose

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Grazed community in aspen stands on the sandy soils in the Aspen Parkland. Interpreted as showing **moderate alteration** from the reference community (AP-SD-G) as a result of grazing impact. This community includes grazed stands in which snowberry is the main increaser. It probably develops from AP-SD-G by decrease in choke-cherry, saskatoon, and graminoids, and increase in snowberry. This community appears to develop in stands with a denser tree canopy, compared to the open, grassy stands included in AP-SD-I. Recommended stocking rates for closed stands are based on average yields in closed shrubby stands that have been altered by grazing; rates in open stands are estimated. The transition to a low shrub type results in lower recommended stocking rates compared to the reference community.

This community was originally described by Thorpe and Godwin (2008).

STRUCTURE

tree cover (n=9)	70% (40 – 90)	herbaceous cover (n=9)	22% (1 – 48)
tall shrub cover (n=9)	12% (0 – 26)	moss cover (n=5)	0% (0 – 1)
short shrub cover (n=9)	28% (6 – 63)	litter cover (n=5)	87% (74 – 97)
prostrate shrub cover (n=9)	1% (0 – 1)	bare soil (n=5)	1% (0 – 3)

SPECIES COMPOSITION (% foliar cover)

<b>Major trees (n=9)</b>		<b>Major graminoids (n=9)</b>	
trembling aspen ( <i>Populus tremuloides</i> )	69% (40 - 92)	sedge ( <i>Carex spp.</i> )	3% (0 - 10)
balsam poplar ( <i>Populus balsamifera</i> )	2% (0 - 3)	awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	1% (0 - 3)
		purple oat-grass ( <i>Schizachne purpurascens</i> )	1% (0 - 2)
		rough-leaved rice-grass ( <i>Oryzopsis asperifolia</i> )	1% (0 - 1)
<b>Major tall shrubs (n=9)</b>		<b>Major forbs (n=9)</b>	
choke-cherry ( <i>Prunus virginiana</i> )	5% (0 - 15)	northern bedstraw ( <i>Galium boreale</i> )	2% (0 - 5)
saskatoon ( <i>Amelanchier alnifolia</i> )	3% (0 - 7)	vetchling ( <i>Lathyrus spp.</i> )	2% (0 - 6)
twining honeysuckle ( <i>Lonicera dioica</i> )	2% (0 - 6)	golden bean ( <i>Thermopsis rhombifolia</i> )	2% (0 - 4)
wolf-willow ( <i>Elaeagnus commutata</i> )	2% (0 - 3)	violet ( <i>Viola spp.</i> )	1% (0 - 4)
river birch ( <i>Betula occidentalis</i> )	1% (0 - 2)	smooth wild strawberry ( <i>Fragaria virginiana</i> )	1% (0 - 4)
<b>Major short shrubs (n=9)</b>		<b>Minor short shrubs (n=9)</b>	
snowberry ( <i>Symphoricarpos spp.</i> )	28% (4 - 63)		1%
rose ( <i>Rosa spp.</i> )	7% (0 - 16)	<b>Minor graminoids (n=9)</b>	
		1%	
<b>Major prostrate shrubs (n=9)</b>		<b>Minor forbs (n=9)</b>	
bearberry ( <i>Arctostaphylos uva-ursi</i> )	1% (0 - 1)	4%	



<b>SIMILARITY TO REFERENCE COMMUNITY</b>	52%	
<b>RECOMMENDED STOCKING RATES</b>		
closed stands (>50% canopy closure)	0.22 AUM/ha	0.09 AUM/ac
open stands (<50% canopy closure)	(0.32 AUM/ha)	(0.13 AUM/ac)



AP-SD-I

Aspen / Sedge - Purple Oat-grass

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Grazed community in aspen stands on sandy soils in the Aspen Parkland. Interpreted as showing **moderate alteration** from the reference community (AP-SD-G) as a result of grazing impact. This community represents the grassy stands that develop under grazing in some areas. It probably develops from AP-SD-G by decrease in shrubs and increase in graminoids. This community appears to develop in stands with a more open tree canopy, compared to AP-SD-H (Aspen / Choke-cherry / Snowberry – Rose). The structure data show generally low tree cover, and the species composition includes several grassland species (e.g. rough fescue, Hooker’s oat-grass, golden bean, pasture sage) which would only be expected in open areas. The recommended stocking rates are based on average yields in open grassy stands that have been altered by grazing; rates for closed stands are estimated. While high grass yield leads to relatively high recommended stocking rates, these are somewhat lower than in the reference community because there is less palatable shrub and forb yield.

This community was originally described by Thorpe and Godwin (2008).

STRUCTURE

tree cover (n=13)	35% (15 – 59)
tall shrub cover (n=30)	4% (0 – 13)
short shrub cover (n=30)	5% (0 – 15)
prostrate shrub cover (n=30)	1% (0 – 5)
herbaceous cover (n=30)	53% (21 – 87)

moss cover (n=25)	4% (0 – 14)
LFH thickness (n=6)	2 cm (0 – 5)
litter cover (n=24)	41% (4 – 89)
bare soil (n=25)	2% (0 – 3)

SPECIES COMPOSITION (% foliar cover)

<b>Major trees (n=13)</b>	
trembling aspen ( <i>Populus tremuloides</i> )	34% (15 - 59)

<b>Major tall shrubs (n=30)</b>	
twining honeysuckle ( <i>Lonicera dioica</i> )	1% (0 - 5)
river birch ( <i>Betula occidentalis</i> )	1% (0 - 0)
choke-cherry ( <i>Prunus virginiana</i> )	1% (0 - 2)
wolf-willow ( <i>Elaeagnus commutata</i> )	1% (0 - 0)

<b>Major short shrubs (n=30)</b>	
rose ( <i>Rosa spp.</i> )	3% (0 - 15)
snowberry ( <i>Symphoricarpos spp.</i> )	2% (0 - 2)

<b>Major prostrate shrubs (n=30)</b>	
bearberry ( <i>Arctostaphylos uva-ursi</i> )	1% (0 - 1)
creeping juniper ( <i>Juniperus horizontalis</i> )	1% (0 - 1)

<b>Major graminoids (n=30)</b>	
sedge ( <i>Carex spp.</i> , especially <i>C. siccata</i> )	15% (1 - 33)
purple oat-grass ( <i>Schizachne purpurascens</i> )	8% (0 - 19)
northern bedstraw ( <i>Galium boreale</i> )	4% (0 - 9)
rough-leaved rice-grass ( <i>Oryzopsis asperifolia</i> )	2% (0 - 8)
awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	2% (0 - 7)
plains rough fescue ( <i>Festuca altaica var. hallii</i> )	1% (0 - 6)
Kentucky blue-grass ( <i>Poa pratensis</i> )	1% (0 - 3)
northern rice-grass ( <i>Piptatherum pungens</i> )	1% (0 - 3)
baltic rush ( <i>Juncus arcticus var. balticus</i> )	1% (0 - 1)
Hooker's oat-grass ( <i>Avenula hookeri</i> )	1% (0 - 0)

<b>Major forbs (n=30)</b>	
vetchling ( <i>Lathyrus spp.</i> )	2% (0 - 7)
American vetch ( <i>Vicia americana</i> )	1% (0 - 1)
golden bean ( <i>Thermopsis rhombifolia</i> )	1% (0 - 2)
smooth wild strawberry ( <i>Fragaria virginiana</i> )	1% (0 - 3)

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<b>Minor tall shrubs (n=30)</b>	1%
<b>Minor graminoids (n=30)</b>	2%
<b>Minor forbs (n=30)</b>	7%

goldenrod ( <i>Solidago spp.</i> )	1% (0 - 2)
veiny meadow-rue ( <i>Thalictrum venulosum</i> )	1% (0 - 0)
pasture sage ( <i>Artemisia frigida</i> )	1% (0 - 1)
woolly yarrow ( <i>Achillea millefolium</i> )	1% (0 - 1)

<b>SIMILARITY TO REFERENCE COMMUNITY</b>	41%
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<b>RECOMMENDED STOCKING RATES</b>		
closed stands (>50% canopy closure)	(0.50 AUM/ha)	(0.20 AUM/ac)
open stands (<50% canopy closure)	0.74 AUM/ha	0.30 AUM/ac

AP-SD-J

Aspen / Snowberry - Rose / Kentucky Blue-grass – Purple Oat-grass

Aspen Parkland: Sand and Sandy Loam Ecosites

**GENERAL DESCRIPTION:** Grazed community with high cover of Kentucky Blue-grass in aspen stands on sandy soils in the Aspen Parkland. Interpreted as showing **significant alteration** from the reference community (AP-SD-G) as a result of grazing impact coupled with exotic invasion. Kentucky blue-grass, as well as forbs such as dandelion, invade stands in which the native shrubs and herbs have been weakened by grazing. Recommended stocking rates are based on average yields in open grassy stands that have been altered by grazing; rates for closed stands are estimated. While high grass yield leads to relatively high recommended stocking rates, these are somewhat lower than in the reference community because there is less yield of palatable shrubs and forbs.

This community was originally described by Thorpe and Godwin (2008).

**STRUCTURE**

tree cover (n=8)	59% (46 – 73)	herbaceous cover (n=12)	48% (38 – 58)
tall shrub cover (n=12)	7% (0 – 22)	moss cover (n=12)	1% (0 – 1)
short shrub cover (n=12)	9% (0 – 20)	litter cover (n=10)	66% (2 – 98)
prostrate shrub cover (n=12)	1% (0 – 4)	bare soil (n=12)	2% (0 – 3)

**SPECIES COMPOSITION** (% foliar cover)

<b>Major trees (n=8)</b>		<b>Major graminoids (n=12)</b>	
trembling aspen ( <i>Populus tremuloides</i> )	59% (46 - 73)	Kentucky blue-grass ( <i>Poa pratensis</i> )	16% (5 - 27)
<b>Major tall shrubs (n=12)</b>		purple oat-grass ( <i>Schizachne purpurascens</i> )	6% (0 - 12)
choke-cherry ( <i>Prunus virginiana</i> )	3% (0 - 10)	sedge ( <i>Carex spp.</i> , especially <i>C. siccata</i> )	4% (0 - 12)
saskatoon ( <i>Amelanchier alnifolia</i> )	3% (0 - 5)	awned wheat-grass ( <i>Elymus trachycaulus ssp. subsecundus</i> )	4% (0 - 9)
wolf-willow ( <i>Elaeagnus commutata</i> )	1% (0 - 5)	rough-leaved rice-grass ( <i>Oryzopsis asperifolia</i> )	2% (0 - 6)
willow ( <i>Salix spp.</i> )	1% (0 - 1)	baltic rush ( <i>Juncus arcticus var. balticus</i> )	1% (0 - 1)
<b>Major short shrubs (n=12)</b>		<b>Major forbs (n=12)</b>	
snowberry ( <i>Symphoricarpos spp.</i> )	15% (0 - 49)	northern bedstraw ( <i>Galium boreale</i> )	4% (0 - 8)
rose ( <i>Rosa spp.</i> )	5% (0 - 10)	golden bean ( <i>Thermopsis rhombifolia</i> )	2% (0 - 4)
wild red raspberry ( <i>Rubus idaeus</i> )	1% (0 - 1)	vetchling ( <i>Lathyrus spp.</i> )	2% (0 - 4)
<b>Major prostrate shrubs (n=12)</b>		violet ( <i>Viola spp.</i> )	1% (0 - 2)
bearberry ( <i>Arctostaphylos uva-ursi</i> )	1% (0 - 4)	common dandelion ( <i>Taraxacum officinale</i> )	1% (0 - 3)
<b>Minor graminoids (n=12)</b>		American vetch ( <i>Vicia americana</i> )	1% (0 - 2)
<b>Minor forbs (n=12)</b>		smooth wild strawberry ( <i>Fragaria virginiana</i> )	1% (0 - 2)



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<b>SIMILARITY TO REFERENCE COMMUNITY</b>	47%
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<b>RECOMMENDED STOCKING RATES</b>		
closed stands (>50% canopy closure)	(0.50 AUM/ha)	(0.20 AUM/ac)
open stands (<50% canopy closure)	0.74 AUM/ha	0.30 AUM/ac

