

## Ecological Site Description—Rangeland

Shallow (Sw), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC057MT



### 1. Physiographic features:

**Landform:** shoulders and side slopes of hills, ridgetops, escarpments

**Elevation (feet):** 2250 - 4500

**Slope (percent):** 0–60

**Depth to Water Table (inches):** greater than 60

**Flooding:** mainly none

**Ponding:** none

**Runoff Class:** low to medium

**Aspect:** all aspects, can be significant

**2. Soils:** These soils are 10 to 20 inches deep to hard rock or soft beds of weathered siltstone or sandstone. Few roots penetrate deeper than 20 inches. Surface textures are mainly silt loam, loam, sandy loam, fine sandy loam, loamy fine sand, and very fine sandy loam. Available Water Holding Capacity to 20 inches is 2 to 4 inches.

**3. Associated sites:** Sandy, Sandy-Steep, Silty, Silty-Steep, and Very Shallow. Rock outcrop is also a common feature associated with this site.

**4. Similar sites:** Shallow clay, Sandy, Silty, Very Shallow.

The Shallow Clay site varies by texture.

The Sandy and Silty sites vary by being over 20 inches deep, and by having significantly more ground cover and production.

The Very Shallow site is less than 10 inches deep, or has a water holding capacity of 2 inches or less.

**5. Major Plant Community Types:** The following are descriptions of several plant communities that may occupy this site:

**Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs:** The physical aspect of this site in the Historical Climax (HCPC) is that of mixed grass/ shrub land dominated by cool-season bunchgrasses and a mixture of shrubs. Approximately 70–80% of the annual production is from grasses and sedges, 5–10% from forbs, and 10–20% is from shrubs and half-shrubs. Canopy cover of shrubs is typically 5 to 15%. Ponderosa pine may occur on this site, as well as Rocky Mountain juniper.

Dominant species include **bluebunch wheatgrass, green needlegrass, plains muhly, western or thickspike wheatgrass, and needleandthread**. Short grasses and sedges such as **Sandberg bluegrass, prairie junegrass, and threadleaf sedge** are also present. There are abundant forbs (**purple and white prairie clover, prairie coneflower, dotted gayfeather**) which occur in smaller percentages. Shrubs such as **Wyoming big sagebrush and skunkbush sumac** are common. **Rocky Mountain and creeping juniper** may also occur.

This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and presence of tall, deep-rooted perennial grasses allows for drought tolerance. Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable moisture conditions. Abundant plant litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This plant community provides for soil stability and a functioning hydrologic cycle.

**Plant Community 2: Medium and Short Grasses and Sedges/ Half-shrubs:** This community occurs from shifts in climate or other disturbances. Dominant species include **needleandthread, western or thickspike wheatgrass, threadleaf sedge, and prairie junegrass**. Bluebunch wheatgrass, green needlegrass, and plains muhly will still be present but in smaller amounts. Palatable and nutritious forbs will be replaced by less desirable and more aggressive species, such as **hairy goldenaster, silverleaf scurfspea, and scarlet globemallow**.

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Grass biomass production and litter become reduced in Community 2 as the taller grasses become less prevalent, increasing evaporation and reducing moisture retention. Additional open space in the community can result in undesirable invader species. This plant community provides for moderate soil stability.

**Plant Community 3: Short and Medium Grasses and Sedges/ Half-shrubs and Shrubs:** This is a disturbance induced community, with dominants including **Sandberg bluegrass, prairie junegrass, threadleaf sedge, perennial forbs, fringed sagewort, and Wyoming big sagebrush**. Remnant amounts of western or thickspike wheatgrass and needleandthread may be present. Tall grasses and palatable forbs will be mostly absent.

The amount of Wyoming big sagebrush in this community can also be the result of lack of fire in Community 4, as periodic fire tends to reduce the amount of big sagebrush that is present. There will be some shifting of sagebrush between communities 3 and 4, depending on the occurrence and frequency of fire.

**Plant Community 4: Short and Medium Grasses and Sedges/ Half-Shrubs:** This is a disturbance induced community, with dominants including **Sandberg bluegrass, prairie junegrass, threadleaf sedge**, and other short grasses. It is similar to Community 3, but having less of a shrub component. Remnant amounts of western or thickspike wheatgrass and needleandthread may be present. Tall grasses and palatable forbs will be mostly absent.

Plant Communities 3 and 4 are much less productive than Plant Communities 1 or 2, and have lost many of the attributes of a healthy rangeland. The loss of deep perennial root systems reduces total available moisture for plant growth. Reduction of plant litter will result in higher surface soil temperatures and increased evaporation losses. Annual species are often aggressive and competitive with seedlings of perennial plants. This community can respond positively to improved grazing management but it will take additional inputs to move it towards a community similar in production and composition to that of Plant Community 1 or 2.

**Plant Community 5: Half-shrubs/ Annual Grasses and Forbs/ Short Grasses:** This community is the result of continual adverse disturbances. Dominant species include **fringed sagewort and broom snakeweed**, and annuals and biennials such as **cheatgrass, Japanese brome, six-weeks fescue, and thistles**. **Red threeawn** and non-native, weedy forbs are also likely to invade. **Blue grama, Sandberg bluegrass, and prairie junegrass** may be present in lesser amounts. **Wyoming big sagebrush** may be a major component depending on the fire history of the site.

Plant community 5 has extremely reduced production of native plants (< 400 lbs. /acre). The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and increased evaporation, which gives short sod grasses and sedges and annual invaders a competitive advantage over the tall and medium grasses. This community has lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow. Significant economic inputs and time would be required to move this plant community toward a higher successional stage and a more productive plant community.

\*Seeding and mechanical treatment are typically not recommended on shallow soils, such as those associated with this ecological site. However, in this Rangeland Resource Unit this ecological site is often a minor component of larger map units containing deeper soils. In these situations, treating the shallow site is often only incidental to treating the larger area of deeper soils. Also, to avoid the shallow component of these areas often becomes impractical. In some locations, shallow soils have been cultivated as part of a field composed of mainly deeper soils. Reseeding is generally feasible and practical in these situations.

### 5a. Cover and structure (Historic Climax Plant Community)

COVER TYPE	BASAL COVER (%)	CANOPY COVER (%)	AVERAGE HEIGHT (inches)
Cryptogams	T-3	0-3	0.25 - .50
Grasses/ sedges	5-12	40-60	18
Forbs	1-4	5-10	6
Shrubs	1-5	1-7	12
Litter	40-60		
Coarse fragments	5-10		
Bare ground	15-30		

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## 5b. Major Plant Species Composition - Historical Climax Plant Community

Common Name	Plant Symbol	Plant Group	Percent Comp.	Group Max. %	Mean Annual Precipitation (inches)			
					11	12	13	14
					(lbs./acre)	(lbs./acre)	(lbs./acre)	(lbs./acre)
<b>Grasses and Sedges</b>				<b>70–80%</b>	<b>644-736</b>	<b>700-800</b>	<b>756-864</b>	<b>812-928</b>
Bluebunch wheatgrass	PSSP6	2	40-60		368-552	400-600	432-648	464-696
Green needlegrass	NAVI4	2	5-10		46-92	50-100	54-108	58-116
Western or Thickspike wheatgrass	PASM ELLAL	14	5-10		46-92	50-100	54-108	58-116
Needleandthread	HECOC8	10	5-10		46-92	50-100	54-108	58-116
Plains muhly *	MUCU3	3	0-5		0-46	0-50	0-54	0-58
Indian ricegrass	ORHY	2	0-10		0-92	0-100	0-108	0-116
Threadleaf sedge	CAFI	12	0–5}	10	0-92 No more than 46 for any one	0-100 No more than 50 for any one	0-108 No more than 54 for any one	0-116 No more than 58 for any one
Sand dropseed	SPCR	9	0-T}					
Blue grama	BOGR2	15	0–5}					
Prairie junegrass	KOMA	12	0–5}					
Sandberg bluegrass	POSE	12	0–5}					
Plains reedgrass	CAMO	16	0–5}					
Other native grasses	2GP		0–5}					
Fendler's or red threeawn	ARPUF	11	0-T}					
<b>Forbs</b>				<b>5–10%</b>	<b>46-92</b>	<b>50-100</b>	<b>54-108</b>	<b>58-116</b>
Purple prairieclover	DAPU5	21	1–5}	10	46-92 No more than 46 for any one	50-100 No more than 50 for any one	54-1089 No more than 54 for any one	58-116 No more than 58 for any one
White prairieclover	DACA7	21	1–5}					
Prairie coneflower	RACO3	23	1–5}					
Dotted gayfeather	LIPU	21	1–5}					
Scurfpea spp.	PSAR	23	1–5}					
Hairy goldenaster	HEVI4	23	1–5}					
Scarlet globemallow	SPCO	20	1–5}					
American vetch	VIAM	18	1–5}					
Milkvetch spp.	ASTRA	24	1–5}					
Hood's phlox	PHHO	28	1–5}					
Tufted milkvetch	ASSP6	24	1-5}					
Primrose spp.	OENOT	24	0-5}					
Buckwheat spp.	ERIOG	23	1-5}					
Western yarrow	ACMI2	19	0–5}					
Biscuitroot spp.	LOMAT	24	0–5}					
Miner's candle	CRBR	24	0-5}					
Penstemon spp.	PENST	28	0–5}					
Pussytoes spp.	ANTEN	20	0–5}					
Prairie thermopsis	THRH	20	0–5}					
Other native forbs	2FP		0–5}					
Twogrooved poisonvetch	ASBI2	24	0-T}	0-T	0-T	0-T	0-T	0-T
White point loco **	OXSE	24						
Larkspur spp. **	DELPH	24						
Death camas **	ZIGAD	32						
<b>Shrubs and Half-shrubs</b>				<b>10–20%</b>	<b>92-184</b>	<b>100-200</b>	<b>108-216</b>	<b>116-232</b>
Skunkbush sumac	RHTR	33	T-5}	20	T-184 No more than 46 for any one	T-200 No more than 50 for any one	T-216 No more than 54 for any one	T-232 No more than 58 for any one
Winterfat	KRLA2	35	0–5}					
Wyoming big sagebrush	ARTRW8	37	T-5}					
Fringed sagewort	ARFR4	38	0–5}					
Yucca	YUGL	37	0-5}					
Rocky Mt. juniper	JUSC2	37	0-T}					
Creeping juniper	JUHO2	38	0-T}					
Prairie rose	ROAR3	38	0–5}					
Green rabbitbrush	CHVI8	36	0-5}					
Rubber rabbitbrush	ERNAN5	36	0–5}					
Other native shrubs	2SB		0–5}					
Broom snakeweed	GUSA2	37	0-T}	0-T	0-T	0-T	0-T	0-T
Plains pricklypear	OPPO	38	0-T}	0-T	0-T	0-T	0-T	0-T
<b>Total Annual Production (lbs./ac):</b>			<b>100%</b>		<b>920</b>	<b>1000</b>	<b>1080</b>	<b>1160</b>

\*This species tends to occur mainly in the higher precipitation areas of the RRU.

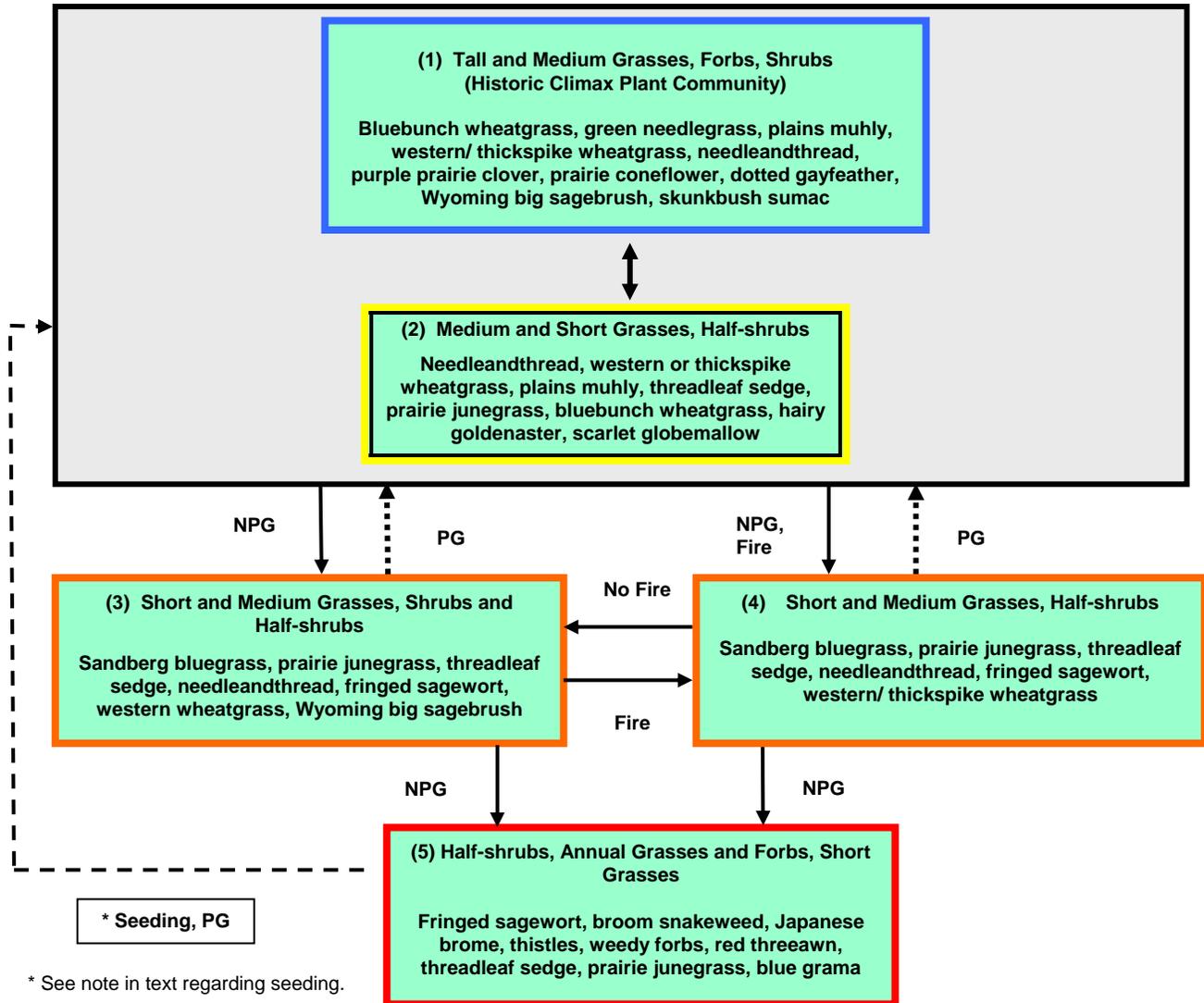
\*\* These plants are poisonous to some grazing animals, during at least some portion of their life cycle.

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## 5c. Plant Communities and Transitional Pathways (diagram)



Smaller boxes within a larger box indicate that these communities will normally shift among themselves with slight variations in precipitation and other disturbances. Moving outside the larger box indicates the community has crossed a threshold (heavier line) and will require intensive treatment to return to Community 1 or 2. Dotted lines indicate a reduced probability for success. Yellow boxes indicate caution that the community may be in danger of crossing a threshold. Orange boxes represent communities that have crossed over thresholds from the HCPC and may be difficult to restore with grazing management alone. Red boxes represent communities that have severely shifted away from the HCPC and probably cannot be restored without mechanical inputs.

NOTE: Not all species present in the community are listed in this table. Species listed are representative of the plant functional groups that occur in the community.

PG = Prescribed Grazing: Use of a planned grazing strategy to balance animal forage demand with available forage resources. Timing, duration, and frequency of grazing are controlled and some type of grazing rotation is applied to allow for plant recovery following grazing.

NPG = Non-Prescribed Grazing: Grazing which has taken place that does not control the factors as listed above, or animal forage demand is higher than the available forage supply.

Fire: Prescribed fire or non-prescribed wildfire.

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**6. Livestock Grazing Interpretations:** Managed livestock grazing is suitable on this site as it has the potential to produce a moderate amount of high quality forage. Forage production is somewhat limited by steep slopes and shallow soils, and the potential for runoff, which reduces the effectiveness of the precipitation received for plant growth. The steeper slopes may also limit livestock travel and result in poor grazing distribution, especially in areas away from water. Management objectives should include maintenance or improvement of the plant community. Shorter grazing periods and adequate re-growth after grazing are recommended for plant maintenance and recovery. Heavy stocking and season long use of this site can be detrimental and will alter the plant community composition and production over time.

Whenever Plant Community 2 (medium and short grasses) occurs, grazing management strategies need to be implemented to avoid further deterioration. This community is still stable, productive, and healthy provided it receives proper management. This community will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move this community back towards the potential community.

Plant Communities 3 and 4 have substantially reduced forage production, and a high percentage of aggressive, non-palatable species. Once these plant communities become established, it will be much more difficult to restore the site to a community that resembles the potential with grazing management alone. Additional growing season rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site.

Plant Community 5 has extremely limited forage production (< 150 lbs./acre), and a high percentage of non-preferred species for cattle and sheep. Seeding may be necessary to restore desirable native perennial species.

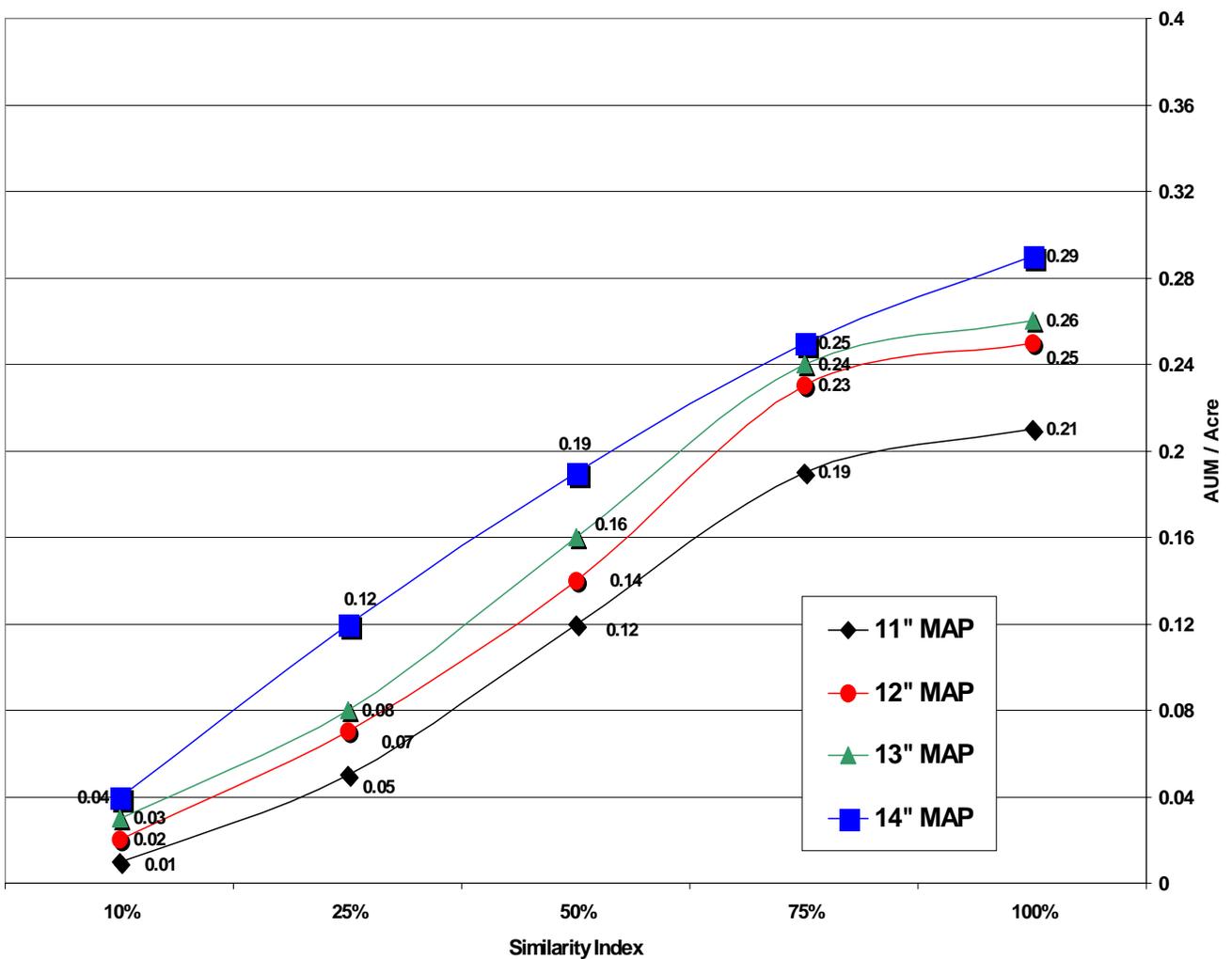
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**6a. Guide to Safe Stocking Rates:** The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. The characteristic plant communities and production values listed may not accurately reflect the productivity of a specific piece of land. These tables should not be used without on-site information collected to determine the average forage productivity of the site. Adjustments to stocking rates for each range unit must be made based on topography, slope, distance to livestock water, and other factors which effect livestock grazing behavior.

**Stocking Rate Guide (Cattle)**  
Shallow 11 - 14", 58AC



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## 6b. Stocking Rate Guide:

Major Plant Community Dominant Plant Species	MAP	Total Production (pounds/ac)	Cattle			Sheep		
			Forage Production	AUM/ac	Ac/AUM	Forage Production	AUM/ac	Ac/AUM
<b>1. Tall and Medium Grasses, Forbs, Shrubs (HCPC)</b> <i>Bluebunch wheatgrass, green needlegrass, western wheatgrass, forbs, skunkbush sumac, Wyoming big sagebrush</i> (S.I. > 75%)	13–14"	1080-1160	925-1050+	.25-.29+	3.5-4.0+	875-1000+	.24-.27+	3.7-4.2+
	11–12"	920-1000	775-900+	.21-.25+	4.1-4.7+	725-850+	.20-.23+	4.3-5.0+
<b>2. Medium &amp; Short Grasses, Half-shrubs</b> <i>Needleandthread, western wheatgrass, plains muhly, threadleaf sedge, prairie junegrass, bluebunch wheatgrass, hairy goldenaster, scarlet globemallow</i> (S.I. 40–75%)	13–14"	595-985	350-850	.10-.23	4.3-10.5	400-900	.11-.25	4.1-9.2
	11–12"	505-850	300-725	.08-.20	5.0-12.2	325-775	.09-.21	4.7-11.3
<b>3. Short &amp; Medium Grasses &amp; Sedges, Shrubs &amp; Half-shrubs</b> <i>Sandberg bluegrass, prairie junegrass, threadleaf sedge, needleandthread, fringed sagewort, western wheatgrass, Wyoming big sagebrush</i> (S.I. 20–40%)	13–14"	430-810	225-475	.06-.13	7.7-16.3	225-575	.06-.16	6.4-16.3
	11–12"	370-700	175-375	.05-.10	9.8-20.9	200-500	.05-.14	7.3-18.3
<b>4. Short &amp; Medium Grasses &amp; Sedges, Half-shrubs</b> <i>Sandberg bluegrass, prairie junegrass, threadleaf sedge, needleandthread, fringed sagewort, western wheatgrass</i> (S.I. 20–40%)	13–14"	375-755	200-450	.05-.12	8.1-18.3	175-500	.05-.14	7.3-20.9
	11–12"	320-650	175-400	.05-.11	9.2-20.9	150-425	.04-.12	8.6-24.4
<b>5. Half-Shrubs, Annual Grasses &amp; Forbs, Short Grasses</b> <i>Fringed sagewort, broom snakeweed, Japanese brome, thistles, weedy forbs, red threeawn, threadleaf sedge, prairie junegrass, blue grama</i> (S.I. < 20%)	11–14"	185-465	50-150	.01–.04	24.4-73.2	75-200	.02–.05	18.3-48.8

Stocking rates are calculated from average forage production values using a 25% Harvest Efficiency factor for preferred and desirable plants, and 10% Harvest Efficiency for less desirable species. AUM calculations are based on 915 pounds per animal unit month (AUM) for a 1,000-pound cow with calf up to 6 months. No adjustments have been made for site grazability factors, such as steep slopes, site inaccessibility, or distance to drinking water.

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**7. Wildlife Interpretations:** The Shallow ecological site, with its complex topography and vegetative structure, along with the tendency to occur in a mosaic with other ecological sites, often provides for a variety of habitat niches and cover types in an otherwise fairly uniform landscape. Historically, mule deer, pronghorn and sage grouse were probably the most conspicuous wildlife species as they still are. The general area provides thermal and escape cover for big game animals as well as a variety of other wildlife species. Shrub availability on steep, south slopes often provides important winter range for mule deer and elk. Abundant prey and perch sites (on rock outcrops and scattered trees) attract a variety of raptors. Sites having steeper, rocky topography provide habitat for interesting songbird species such as rock wrens, canyon wrens and spotted towhees. Scattered junipers and pines host field sparrows and chipping sparrows. The interface of sandy and shale geologic substrates often results in seeps forming on side-hills and toe slopes. These are an important water source for wildlife as well as a source of biodiversity.

**Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs (HCPC):** The diversity of forbs, half-shrubs and shrubs provides feeding substrate for a variety of pollinating insects, which are prey for many birds, reptiles and small mammals. Springs and seeps are habitat for amphibians such as tiger salamanders. The short-horned lizard is a representative reptile. The diversity of plant species and life forms, in combination with topographic variation, provides high quality bird habitat. Lark sparrows, green-tailed towhees, mountain bluebirds and golden eagles are examples of birds using this community. Sharp-tailed grouse and sage grouse may use this community for lek sites on ridge tops and fairly level topography. The diversity of forbs and shrubs favors browsers and selective feeders such as mule deer and pronghorn. Large animal nutrition levels are relatively high yearlong because of plant species and life form diversity. Winter range value is often high for big game species when topographic diversity provides south exposures and browse plants such as skunkbush sumac and winterfat are available. Small mammal diversity may be fairly high. Example species include the kangaroo rat, deer mouse, olive-backed pocket mouse and desert cottontail.

**Plant Community 2: Medium and Short Grasses and Sedges/ Half-shrubs:** Insect diversity may decline with a partial loss of forb variety. The reduction of taller grasses and some desirable shrubs degrades habitat value for many birds, small mammals and big game. Potential increases in half-shrubs and shrubs may maintain big game winter range feeding value, although thermal cover is reduced. Small mammal diversity declines with the loss of vegetative diversity and litter cover.

**Plant Community 3: Short Grasses & Sedges/ Half-shrubs and Shrubs:** Insects may be abundant at the height of population cycles but species diversity is reduced significantly. Springs and seeps are very degraded which results in poor amphibian habitat. Sparse vegetation and increased bare ground may provide suitable habitat for a few species (i.e. horned larks) but the lack of complex vegetative structure and residual cover makes this community poor habitat in general for most ground-nesting birds and relatively poor big game habitat. Pronghorn and mule deer may forage in this type throughout the year. However, nutritional levels for big game are greatly reduced and are available for a much shorter period as compared to the HCPC.

**Plant Community 4: Short and Medium Grasses and Sedges/ Half-shrubs:** The habitat values of this community are similar to Community No. 3, above, except that the lack of big sagebrush makes big game habitat even less valuable.

**Plant Community 5: Half-shrubs/ Annual Grasses and Forbs/ Short Grasses:** General wildlife habitat value is very poor in this community. Insect diversity and abundance is considerably reduced which decreases feeding opportunity for amphibians, birds and some small mammals. The lack of complex vegetative structural diversity, a shortened period of active plant growth and loss of ground cover make the habitat inhospitable for many birds and most small mammals. Big sagebrush, if present, and fringed sagewort provide some valuable big game winter forage. Thermal cover values are very limited with the loss of skunkbush sumac and other shrubs as well as herbaceous cover. Small mammal diversity is very low. The seed-eating deer mouse may be fairly well represented.

**8. Hydrology Data:** The runoff potential for this site is low to moderate, depending on slope and ground cover/health. Runoff curve numbers generally range from 78 to 90. The soils associated with this ecological site are generally in Hydrologic Soil Group C. The infiltration rates for these soils will normally be moderate to moderately rapid.

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## 9. Site Documentation:

**Authors:** Original: NRCS, 1983      Revised: MJR, REL, RSN, POH, 2003

### Supporting Data for Site Development:

NRCS–Production & Composition Record for Native Grazing Lands (Range-417): 7  
BLM–Soil & Vegetation Inventory Method (SVIM) Data: 3  
NRCS–Range Condition Record (ECS-2): 10  
NRCS–Range/Soil Correlation Observations & Soil 232 notes: 32  
Ecological Site Reference: NRCS 417 No.: Wheatland County 509, Golden Valley County 517

### Field Offices where this site occurs within the state:

Big Sandy	Columbus	Harlowton	Roundup
Big Timber	Crow Agency	Joliet	Stanford
Billings	Fort Belknap	Lewistown	White Sulphur Springs
Chinook	Hardin	Malta	Winnett

**Site Approval:** This site has been reviewed and approved for use:

Loretta J. Metz  
State Rangeland Management Specialist

10/22/2004  
Date

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Sedimentary Plains, Central  
Plant Community 1  
HCPC  
Golden Valley County  
Bluebunch wheatgrass



Shallow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
HCPC



Shallow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 1  
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Shallow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 1 to 2



Shallow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 1 to 2



Shallow, 11–14" MAP  
Sedimentary Plains, Central  
Plant Community 2