

## Ecological Site Description—Rangeland

Coarse Clay (CC), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central  
R058AC614MT



**1. Physiographic features:** This site is associated with hard, acidic shales that act like sand (dunes can occur). Outcroppings of the shales are common.

- Landform:** plains and hills in shale uplands
- Elevation (feet):** 2,250–4,500
- Slope (percent):** 0–25, mainly less than 8
- Depth to Water Table (inches):** greater than 60
- Flooding:** none
- Ponding:** none
- Runoff Class:** medium to very high
- Aspect:** not significant

**2. Soils:** Silt clay loam, silty clay, or clay, to a depth of 40 inches. They are often dark colored due to the color of the shale parent material. There may be up to 60% shale fragments in the upper part of the soil. The characteristics of the shales cause these soils to respond similar to Sands, and have a similar plant community composition. However, they are significantly less productive.

Available water holding capacity to 40 inches is less than 4 inches. Reaction (pH) (1:1 water): extremely acid to slightly acid (3.5 – 6.5) mainly because of sodium sulfate.

**3. Associated sites:** Clayey, Clayey-Steep, Shallow Clay, and Shale.

**4. Similar sites:** Shale, Sandy, Shallow Clay

The Shale site differs by being very sparse and low producing, and having a much different plant community.

The Sandy site often has a somewhat similar plant community, but is much more productive, plus being on sandy soils instead of shales.

The Shallow Clay site differs by having a different plant community.

**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 is that of sparse grassland or savannah dominated by warm-season grasses with scattered Ponderosa pine, and/or Rocky Mountain juniper in some locations. Approximately 70–80% of the annual production is from grasses and sedges, 5–10% from forbs, and 15–20% is from shrubs and half-shrubs.

This plant community is dominated by species that also commonly occur on a sandy site. Warm season grasses (**prairie sandreed**) are a major component. Cool season species such as **bluebunch wheatgrass**, **needleandthread**, **Indian ricegrass**, **sun sedge**, and **thickspike/western wheatgrass** are the major sub-dominants. Few forbs occur in small amounts. A number of shrubs occur in small percentages, including **longleaf sagebrush**, **prairie rose**, **yucca**, **rubber rabbitbrush**, and **Wyoming big sagebrush**.

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.

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**Plant Community 2: Medium and Short Grasses and Sedges/ Shrubs and Half-shrubs:** This community occurs due to minor climate shifts or slight variations in soils and/or topography or disturbance, including non-prescribed grazing. Dominants include medium and short grasses and sedges such as **thickspike/western wheatgrass, needleandthread, prairie junegrass, and threadleaf sedge**. Most of the taller and more palatable grasses (prairie sandreed, bluebunch wheatgrass, Indian ricegrass) will still be present but in smaller amounts. Shrubs and half-shrubs such as **Wyoming big sagebrush, longleaf sage, slenderbush eriogonum, yucca, and Rocky Mountain juniper** become more common. Palatable and nutritious forbs will begin to be replaced by less desirable and more aggressive species such as prairie thermopsis and green sagewort.

Grass biomass production and litter become reduced on 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. These plant communities provide for moderate soil stability.

**Plant Community 3: Shrubs, Short Grasses:** This is a disturbance induced community, with dominants including shrubs, short grasses and sedges such as **Rocky Mountain juniper, Wyoming big sagebrush, longleaf sage, yucca, slenderbush eriogonum, prairie rose, threadleaf sedge, perennial forbs, and prairie junegrass**. Undesirable species such as **red or Fendler's threawn** can become more abundant. There may still be remnant amounts of some of the late and mid-seral species such as prairie sandreed, bluebunch wheatgrass, thickspike/western wheatgrass, Indian ricegrass, and needleandthread present, usually underneath the shrubs. Palatable forbs will be mostly absent. **Broom snakeweed and plains pricklypear** may begin to become common.

**Plant Community 4: Trees and Large Shrubs:** In the absence of fire, probably coupled with continual adverse disturbances, this community can shift to one that is nearly all **Rocky Mountain juniper and/or ponderosa pine**. There is typically very little understory vegetation in this situation, primarily because of the droughty nature of the soils. The understory that is present is typically comprised of species such as **broom snakeweed, annual grasses** plus a few remnant species such as threadleaf sedge, needleandthread, thickspike/western wheatgrass, and prairie junegrass.

(When the canopy cover of trees exceeds 10 percent, the forested guide "Ponderosa Pine Series, Dry Environment" should be used.)

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. The landscape features often associated with this ecological site as well as the droughty nature of the soils severely limits the use of most common structural improvement practices.

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

COVER TYPE	BASAL COVER (%)	CANOPY COVER (%)	AVERAGE HEIGHT (inches)
Cryptogams	0–T	0–T	0.25
Grasses/ sedges	3–7	30–50	24
Forbs	1–2	1–5	18
Shrubs	T–1	5–10	24
Trees	T–1	0–10	30–40 feet
Litter	15–25		
Coarse fragments	0–5		
Bare ground	60–80		

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

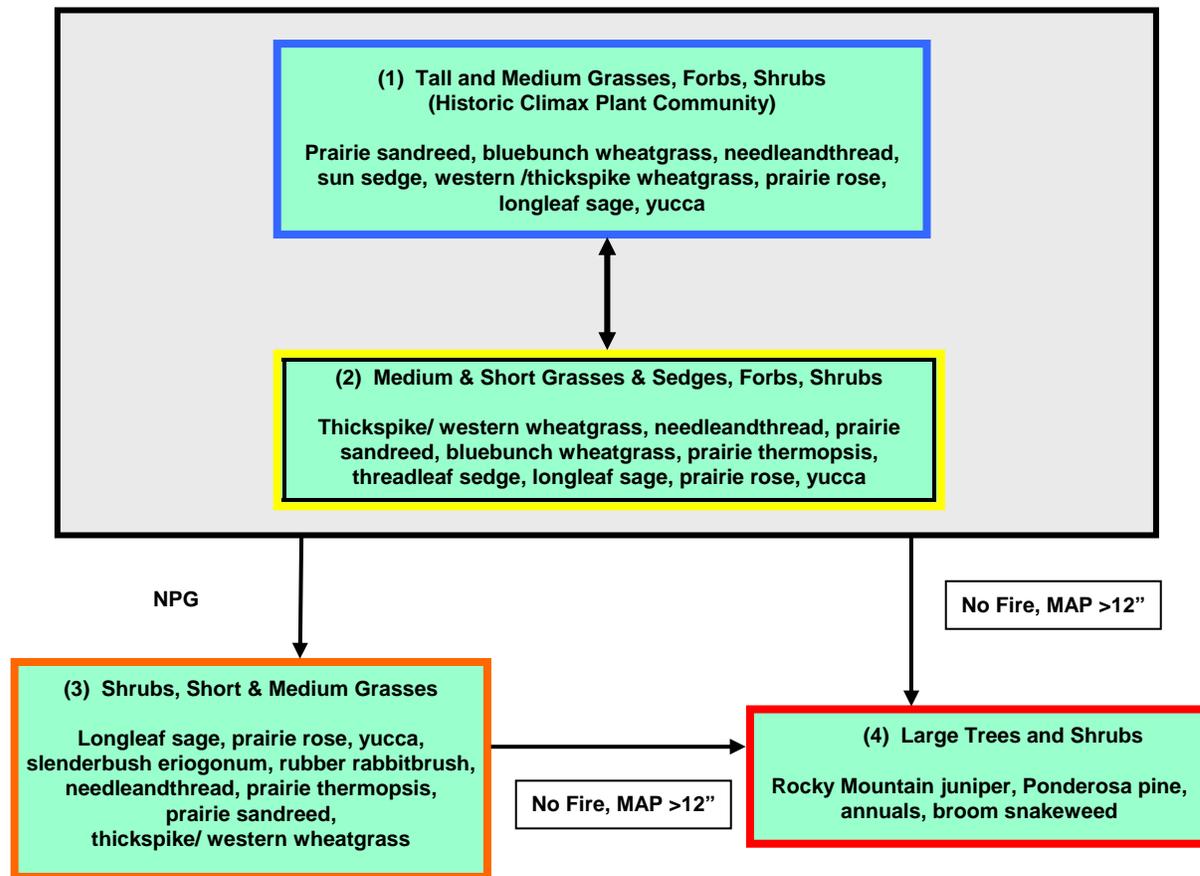
Common Name	Plant Symbol	Plant Group	Percent Comp.	Group Max. %	Mean Annual Precipitation (inches)			
					11	12	13	14
					(lbs./acre)	(lbs./acre)	(lbs./acre)	(lbs./acre)
<b>Grasses and Sedges 70–80%</b>					<b>335-380</b>	<b>420-480</b>	<b>510-580</b>	<b>595-680</b>
Prairie sandreed	CALO	5	30-50		145-240	180-300	220-365	255-425
Bluebunch wheatgrass	PSSP6	2	10-15		45-70	60-90	75-110	85-125
Little bluestem	ANSC10	1	0-5		0-25	0-30	0-35	0-40
Needleandthread	HECOC8	10	0-10		0-45	0-60	0-75	0-85
Sun sedge	CAHE5	3	10-15		45-70	60-90	75-110	85-125
Western or Thickspike wheatgrass	PASM ELLAL	14	5-10	10	25-45	30-60	35-75	40-85
Threadleaf sedge	CAFI	12	0-5}	10	5-45 No more than 25 for any one	6-60 No more than 30 for any one	7-75 No more than 35 for any one	8-85 No more than 40 for any one
Indian ricegrass	ACHY	2	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	T	0-T	0-T	0-T	0-T
<b>Forbs 5–10%</b>					<b>25-45</b>	<b>30-60</b>	<b>35-75</b>	<b>40-85</b>
Dotted gayfeather	LIPU	21	1-5}	10	5-45 No more than 25 for any one	6-60 No more than 30 for any one	7-75 No more than 35 for any one	8-85 No more than 40 for any one
Scurfpea spp.	PSORA	23	0-5}					
Hairy goldenaster	CHVI0	23	0-5}					
Prairie thermopsis	THRH	20	0-5}					
American vetch	VIAM	18	0-5}					
Milkvetch spp.	ASTRA	24	0-5}					
Hood's phlox	PHHO	28	0-5}					
Green sagewort	ARDR4	19	0-5}					
Buckwheat spp.	ERIOG	24	0-5}					
Bastard toadflax	COUM	23	0-5}					
Western yarrow	ACMI2	19	0-5}					
Biscuitroot spp.	LOMAT	24	0-5}					
Missouri goldenrod	SOMI2	19	0-5}					
Other native forbs	2FP		0-5}					
<b>Shrubs and Half-shrubs 15–20%</b>								
Slenderbush eriogonum	ERMI4	38	1-10}	20	5-95 No more than 25 for any one	6-120 No more than 30 for any one	7-145 No more than 35 for any one	8-170 No more than 40 for any one
Longleaf sagebrush	ARLO7	38	1-10}					
Wyoming big sagebrush	ARTRW	37	1-10}					
Rubber rabbitbrush	ERNAN5	36	1-10}					
Prairie rose	ROAR3	38	1-10}					
Skunkbush sumac	RHTR	33	0-10}					
Creeping juniper	JUHO	38	0-10}					
Yucca	YUGL	37	1-10}					
Other native shrubs	2SB		0-10}					
Broom snakeweed	GUSA2	37	0-T}					
Plains pricklypear	OPPO	38	0-T}					
<b>Total Annual Production (lbs/ac):</b>			<b>100%</b>		<b>475</b>	<b>600</b>	<b>725</b>	<b>850</b>

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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.

Matted: >50% cover

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**6. Livestock Grazing Interpretations:** Managed livestock grazing is suitable on this site as it has the potential to produce high quality forage. However, forage production can be severely limited by the soil properties. 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 and sedges) 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. Practices such as range seeding or mechanical treatment are generally not recommended on this site.

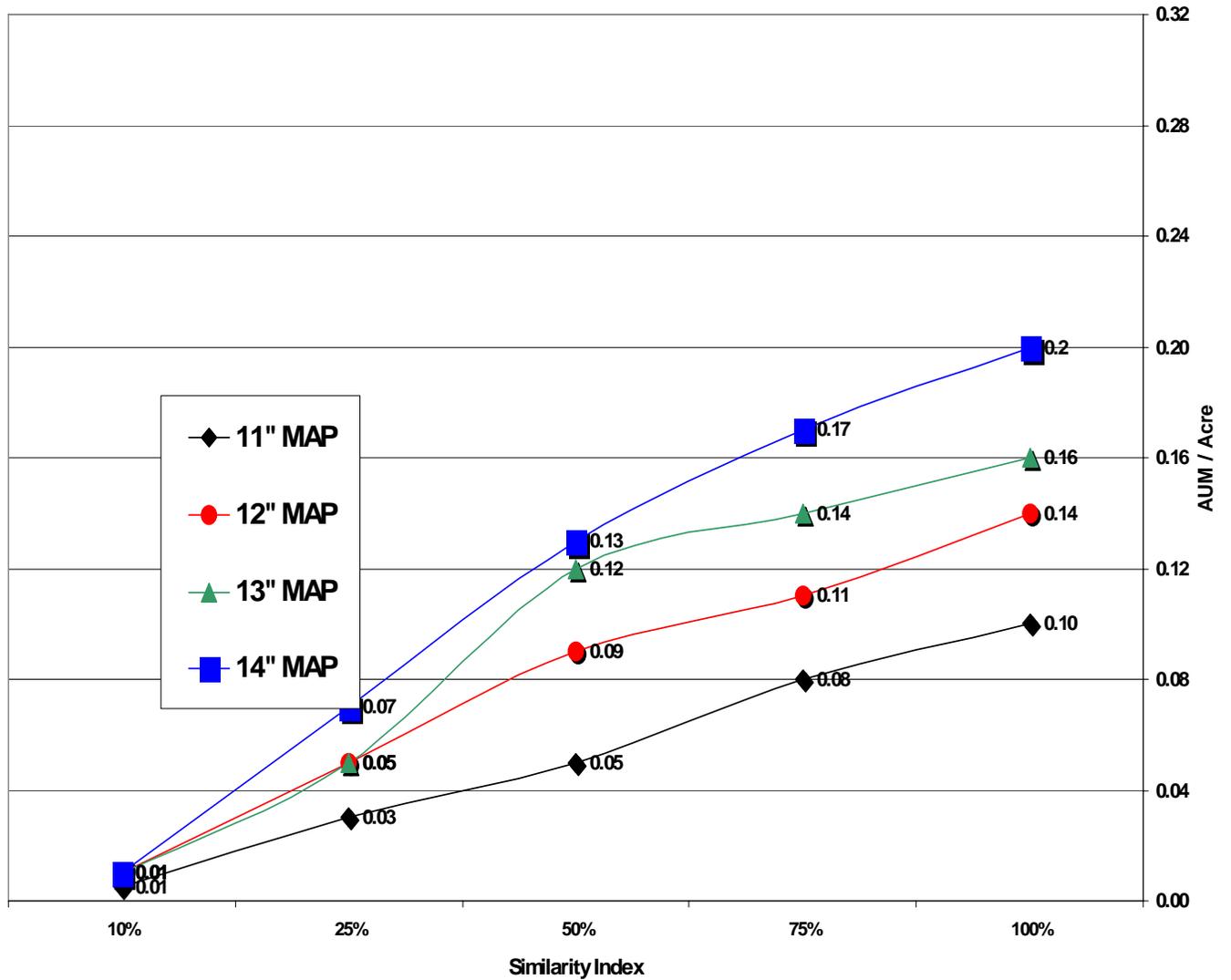
**6a. Guide to Safe Stocking Rates:** The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. The characteristic plant communities and production 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.

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Stocking Rate Guide (Cattle)  
Coarse Clay 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>Prairie sandreed, bluebunch wheatgrass, needleandthread, sun sedge, western/ thickspike wheatgrass, longleaf sage, rose, forbs</i>  (S.I. >75%)	13–14"	725-850	575-725+	.16-.20+	5.0-6.4	625-775+	.17-21+	4.7-5.9
	11–12"	475-600	375-500+	.10-.14+	7.3-9.8	400-550+	.11-.15+	6.7-9.2
<b>2. Medium and Short Grasses, Shrubs and Half-shrubs</b>  <i>Thickspike/ western wheatgrass, needleandthread, prairie sandreed, bluebunch wheatgrass, prairie thermopsis, threadleaf sedge, longleaf sage, prairie rose, yucca</i>  (S.I. 40–75%)	13–14"	365-640	225-475	.06-.13	7.7-16.3	250-500	.07-.14	7.3-14.6
	11–12"	240-450	150-350	.04-.10	10.5-24.4	150-350	.04-.10	10.5-24.4
<b>3. Shrubs, Short Grasses and Sedges, Half-shrubs</b>  <i>Longleaf sage, prairie rose, yucca, slenderbush eriogonum, rubber rabbitbrush, needleandthread, prairie thermopsis, prairie sandreed, thickspike/ western wheatgrass</i>  (S.I. 20–40%)	13–14"	145-425	50-250	.01-.07	14.6-73.2	75-275	.02-.08	13.3-48.8
	11–12"	95-300	50-175	.01-.05	20.9-73.2	50-200	.01-.05	18.3-73.2
<b>(4) Large Trees and Shrubs</b>  <i>Rocky Mountain juniper, Ponderosa pine, annuals, broom snakeweed</i>  (S.I. < 20%)	11–14"	—	0	0	0	0	0	0

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 4 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:** Although not as productive as many sites, the Coarse Clay ecological site provides habitat diversity in an otherwise fairly uniform landscape. Historically, mule deer, pronghorn and a variety of song birds were probably the most conspicuous wildlife species using this site as they are today. Trees, shrubs and a relatively sparse herbaceous layer form a relatively complex vertical structure that is unavailable in adjacent grasslands. Topographic diversity, combined with a number of nutritious browse plants, provides mule deer and pronghorn with winter range habitat. A variety of birds find perch sites and nesting habitat in pine and juniper trees and shrubs in the middle canopy layer.

**Plant Community 1: Tall Grasses / Forbs / Shrubs (HCPC):** The diversity of plant life forms and seasonality provides habitat for a variety of pollinating insects. The short-horned lizard and prairie rattlesnake are representative reptiles. Ground-nesting bird habitat value is limited because of the high proportion of bare soil. Common nighthawks may nest on the sparsely covered surface. Scattered pines, junipers and bur oak provide valuable habitat for a variety of raptors and songbirds including American kestrels, Townsend's solitaires, chipping sparrows, field sparrows, lark sparrows and white-crowned sparrows. Mountain bluebirds may nest in tree cavities and mourning doves on tree branches. Although this community has relatively low productivity, the diversity of warm and cool season grasses and sedges, forbs, shrubs and half-shrubs provides a high plane of nutrition for grazers and mixed feeders throughout the growing season and beyond. Mule deer and pronghorn will use the variety of browse species throughout the year. Small mammal populations are dominated by seed-eaters such as deer mice and the least chipmunk

**Plant Community 2: Medium and Short Grasses and Sedges / Shrubs and Half-shrubs:** Insect diversity may decline as the variety of grasses and forbs is reduced. Structural habitat diversity for a wide range of non-game species is also decreased. An increase in shrubs and half-shrubs provides seasonal browse for mule deer and pronghorn although nutritional value declines with a partial loss of shrub diversity.

**Plant Community 3: Shrubs, Short Grasses:** General wildlife habitat values have declined significantly at this stage. Very little forage is available for ungulates, although an increase in shrubs and half-shrubs provides fall-spring browse for mule deer and pronghorn. Habitat structure has been greatly simplified which reduces small mammal and song bird diversity.

**Plant Community 4: Trees and Large Shrubs:** Pollinating insect diversity is considerably reduced as the plant community is simplified. A significant increase in ponderosa pine, juniper or, in some cases, bur oak, benefits some songbird species such as those listed in #1, above. Ground-nesting bird and small mammal habitat values are very significantly reduced with the loss of ground cover.

**8. Hydrology Data:** The soils associated with this ecological site are generally in Hydrologic Soil Group D. The infiltration rates for these soils will normally be moderate. The runoff potential for this site is moderate to very high, depending on slope and ground cover/health. Runoff curve numbers generally range from 84 to 93.

### 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): 8

BLM–Soil & Vegetation Inventory Method (SVIM) Data: 2

NRCS–Range Condition Record (ECS-2): 25

NRCS–Range/Soil Correlation Observations & Soil 232 notes: 13

Ecological Site Reference: NRCS 417 No.: Golden Valley County 520

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### 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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Coarse Clay, 11-14" MAP,  
Sedimentary Plains, Central  
Plant Community 1  
HCPC



Coarse Clay, 11-14" MAP,  
Sedimentary Plains, Central  
Plant Community 1



Coarse Clay, 11-14" MAP,  
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Coarse Clay, 11-14" MAP,  
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Plant Community 1  
HCPC  
Musselshell County