

Ecological Site Description—Rangeland

Shallow to Gravel (SwG), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central
R058AC194MT



1. Physiographic features: This ecological site most often occurs on level, nearly level, and moderately steep alluvial fans, knolls, stream terraces, and terrace escarpments. Slopes range from 0–15%, but can occasionally occur on slopes greater than 15%. It also occurs on nearly level valley bottoms not subject to a water table or overflow events.

Elevation (feet): 2250 - 4500

Landform: stream terrace, knoll, outwash plain, high flood plain steppe, terrace escarpment

Slope (percent): 0–45, mainly less than 15

Depth to Water Table (inches): greater than 60

Flooding: none too rare

Ponding: none

Runoff Class: medium

Aspect: not significant

2. Soils: These soils are moderately deep to very deep. Depth to sand and gravel is typically 10 to 20 inches. Few roots penetrate beyond a depth of 20 inches. The upper 10–20 inches of the soil will typically have at least 20 to 35% less gravel than the lower part of the soil profile. Available Water Holding Capacity to 40 inches is 2 - 4 inches.

3. Associated sites: Mainly Silty and Silty-Steep. Sometimes associated with Gravel or Clayey-Steep sites.

4. Similar sites: Silty, Shallow, Shallow Clay, Gravel.

The Silty site differs mainly by being over 20 inches deep to any root limiting material, including gravel.

The Shallow site is over hard rock or semi-consolidated beds, not gravels.

The Shallow Clay site differs by being clayey texture and underlain by shales.

The Gravel site will be very droughty, having a water holding capacity of less than 2 inches. It is very gravelly to within 10 inches of the surface.

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 Historical Climax is that of a grassland dominated by cool and warm season grasses and a mixture of forbs and shrubs. Approximately 80–90% of the annual production is from grasses and sedges, 10–15% from forbs, and 1–5% is from shrubs and half-shrubs. The canopy cover of shrubs is typically 1–10%.

Dominant species include **bluebunch wheatgrass, 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 clovers, prairie coneflower, dotted gayfeather**) which occur in smaller percentages. Shrubs such as **Wyoming big sagebrush and skunkbush sumac** may be common. **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. Dominants include **needleandthread, western or thickspike wheatgrass, threadleaf sedge, and prairie junegrass**. Bluebunch wheatgrass and plains muhly will still be present but in smaller amounts.

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Palatable and nutritious forbs will be replaced by less desirable and more aggressive species, such as **hairy goldenaster, silverleaf scurfpea, and scarlet globemallow**.

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. This plant community provides for moderate soil stability.

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

Plant Community 4: Half-Shrubs/ Short Grasses & Sedges/Annual Grasses & Forbs: This community is the result of continual adverse disturbances. Dominants include **broom snakeweed, fringed sagewort, cheatgrass or Japanese brome, six-weeks fescue, Fendler's threawn, and weedy forbs**. Remnant amounts of **prairie junegrass and threadleaf sedge** may be present. Tall grasses and palatable forbs will be mostly absent. **Wyoming big sagebrush** may be a component depending on the fire history of the site.

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 4 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 MLRA /RRU, this ecological site is often a minor component of larger map units containing deeper soils. In these situations, treating the shallow to gravel 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-T	0.25
Grasses/ sedges	5-12	40-60	18
Forbs	1-4	5-10	10
Shrubs	1-5	0-7	12
Litter	45-65		
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)	
Grasses and Sedges					80–90%	720-810	800-900	880-990	960-1080
Bluebunch wheatgrass	PSSP6	2	40-70		360-630	400-700	440-770	480-840	
Needleandthread	HECOC8	10	5-15		45-135	50-150	55-165	60-180	
Western or Thickspike wheatgrass	PASM ELLAL	14	5-10	10	45-90	50-100	55-110	60-120	
Threadleaf sedge	CAFI	12	5-10		45-90	50-100	55-110	60-120	
Plains muhly *	MUCU3	3	0-5		-	0-100	0-110	0-120	
Blue grama	BOGR2	15	0–5}						
Prairie junegrass	KOMA	12	0–5}	5	0-45	0-50	0-55	0-60	
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}	0–T	0–T	0–T	0–T	0–T	
Forbs					10–15%	90-135	100-150	110-165	120-180
Purple prairieclover	DAPU5	21	1–5}						
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	0-5}						
Scarlet globemallow	SPCO	20	0-5}						
American vetch	VIAM	18	0-5}						
Milkvetch spp.	ASTRA	24	0-5}						
Hood's phlox	PHHO	28	0-5}						
Tufted milkvetch	ASSP6	24	0-5}	15	9-135 No more than 45 for any one	10-150 No more than 50 for any one	11-165 No more than 55 for any one	12-180 No more than 60 for any one	
Primrose spp.	OENOT	24	0-5}						
Buckwheat spp.	ERIOG	23	0-5}						
Western yarrow	ACMI2	19	0–5}						
Biscuitroot spp.	LOMAT	24	0–5}						
Miners 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							
White point loco **	OXSE	24	0–T}	0–T	0–T	0–T	0–T	0–T	
Larkspur spp. **	DELPH	24							
Death camas **	ZIGAD	32							
Shrubs and Half-shrubs					1–5%	9-45	10-50	11-55	12-60
Skunkbush sumac	RHTR	33	0-5}						
Wyoming big sagebrush	ARTRW8	37	T-5}						
Fringed sagewort	ARFR4	38	0–5}						
Yucca	YUGL	37	0-5}						
Creeping juniper	JUHO2	38	0–T}	5	9-45	10-50	11-55	12-60	
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}						
Total Annual Production (lbs./ac):			100%		900	1000	1100	1200	

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

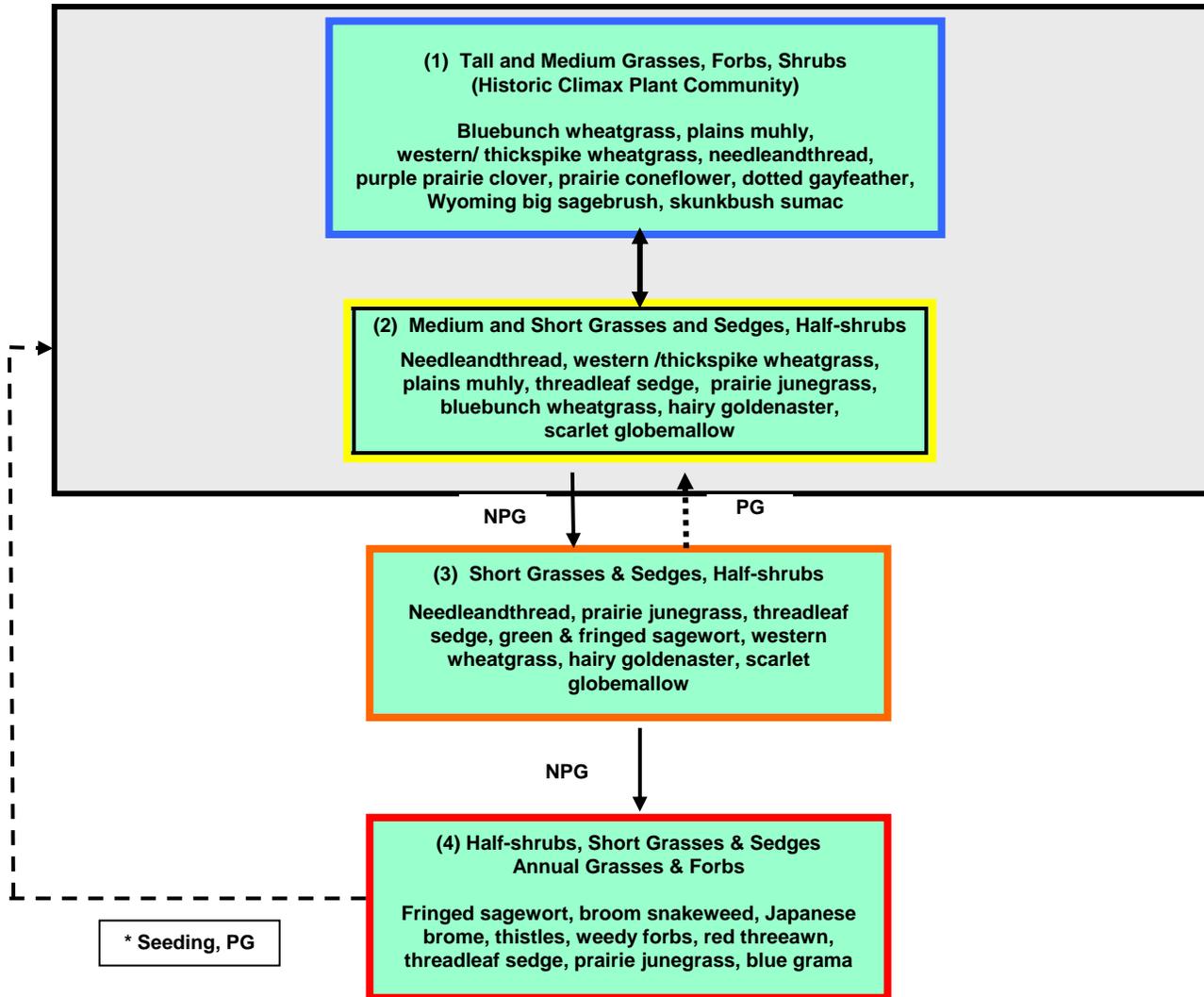
** These plants are poisonous to some grazing animals, during at least some portion of their life cycle.

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5c. Plant Communities and Transitional Pathways (diagram)



* See note in text regarding seeding.

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.

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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, droughty 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 4 has extremely limited forage production (< 175 lbs./acre), and a high percentage of non-preferred species for cattle and sheep. Seeding may be necessary to restore desirable native perennial species. See note on seeding under Plant Community 4.

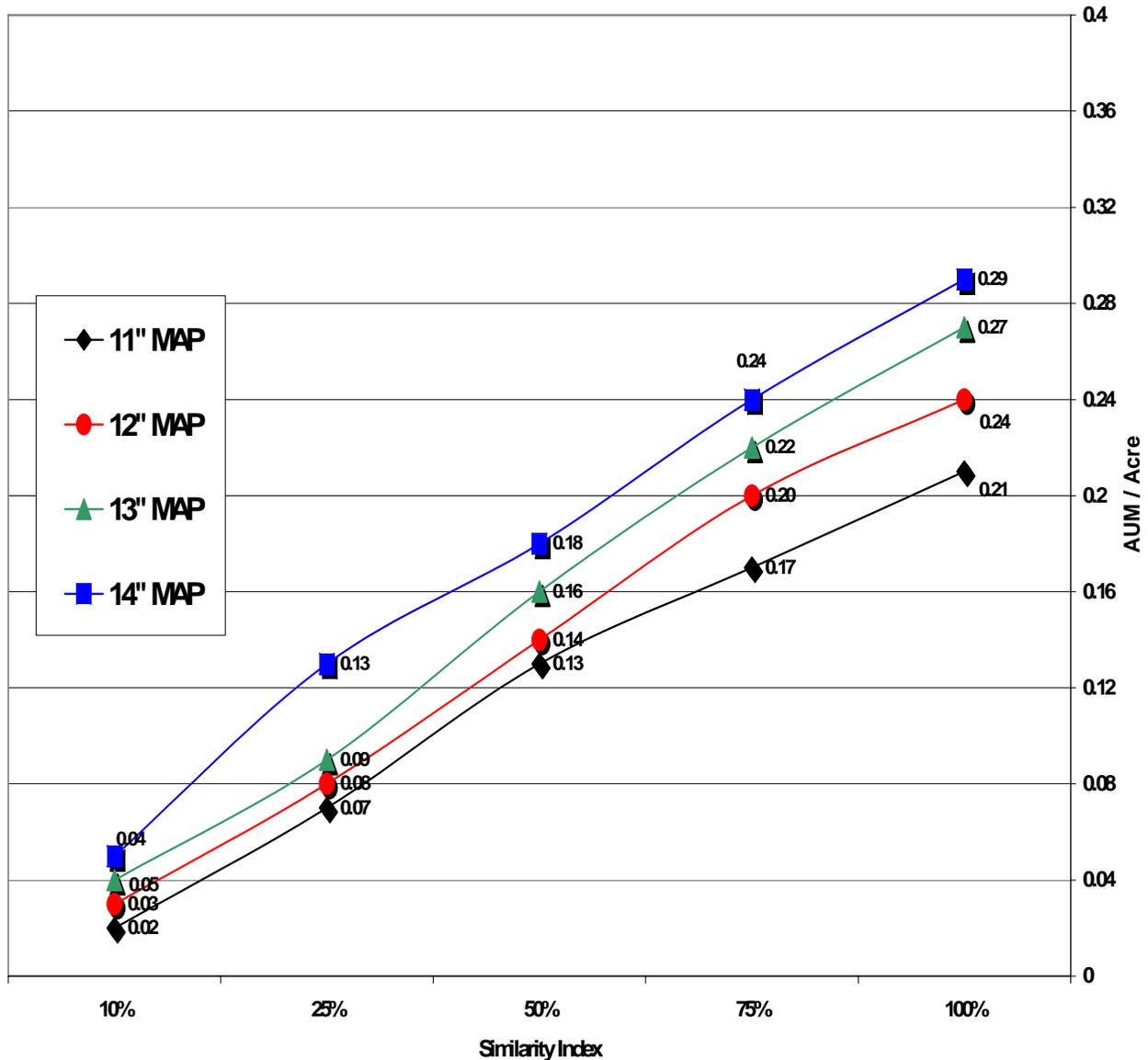
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6a. Guide to Safe Stocking Rates: The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. 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 to Gravel 11-14" MAP 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/AU M
1. Tall and Medium Grasses, Forbs, Shrubs (HCPC) <i>Bluebunch wheatgrass, plains muhly, western/ thickspike wheatgrass, needleandthread, purple prairie clover, prairie coneflower, dotted gayfeather, Wyoming big sagebrush, skunkbush sumac</i> (S.I. > 75%)	13–14"	1100-1200	950-1075 +	.26-.29+	3.4-3.9+	875-1025 +	.24-.28+	3.6-4.2+
	11–12"	900-1000	775-900 +	.21-.25+	4.1-4.7+	725-850 +	.20-.23+	4.3-5.0+
2. Medium & Short Grasses, Half-shrubs <i>Needleandthread, western wheatgrass, plains muhly, threadleaf sedge, prairie junegrass, bluebunch wheatgrass, hairy goldenaster, scarlet globemallow</i> (S.I. 40–75%)	13–14"	605-1020	375-875	.10-.24	4.2-9.8	400-925	.11-.25	4.0-9.2
	11–12"	495-850	300-725	.08-.20	5.0-12.2	325-775	.09-.21	4.7-11.3
3. Short Grasses & Sedges, Half- shrubs <i>Needleandthread, prairie junegrass, threadleaf sedge, green & fringed sagewort, western wheatgrass, hairy goldenaster, scarlet globemallow</i> (S.I. 20–40%)	13–14"	440-840	225-500	.06-.14	7.3-16.3	250-550	.07-.15	6.7-14.6
	11–12"	360-700	175-425	.05-.12	8.6-20.9	200-450	.05-.12	8.1-18.3
4. Half-Shrubs, Short Grasses Annual Grasses & Forbs <i>Fringed sagewort, broom snakeweed, Japanese brome, thistles, weedy forbs, red threeawn, threadleaf sedge, prairie junegrass, blue grama</i> (S.I. < 20%)	11–14"	180-480	50-175	.01-.05	20.9-73.2	75-225	.02-.06	16.3- 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: Because this site often occurs as a minor component in a complex with large expanses of the relatively uniform Silty Ecological Site, it adds wildlife habitat diversity to the landscape. The historical extent of this site on the landscape is probably similar to the present distribution because the soils and topography are not suitable for conversion to cropland. On southern and western exposures, Wyoming big sagebrush, creeping juniper and skunkbush sumac provide winter browse for mule deer and pronghorn. Skunkbush sumac, and other shrubs provide breeding habitat for some passerine birds, such as the spotted towhee and loggerhead shrike. Mountain plovers may nest on the relatively open, pebbly ground surface and rock wrens often inhabit the rocky face of escarpments. When the site is found on terrace escarpments, golden eagles take advantage of a hunting opportunity as they cruise low to the ground along the face of the slope to surprise cottontails and other small mammals. Noxious weeds, such as spotted knapweed, can rapidly colonize this site.

Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs (HCPC): Pollinator insect diversity may be high, reflecting the abundance and variety of flowering plants. Reptiles are represented by the prairie rattlesnake and bull snake and short-horned lizard. Hummingbirds are attracted to brightly colored flowering plants. Ground-nesting birds that favor light to medium ground cover, such as long-billed curlews, find adequate litter cover and residual plant material in spring to hide the nest site from predators. Sharp-tailed grouse may find lek sites where this community occurs on ridge tops and relatively level ground. A diverse forb and shrub component provides mule deer and pronghorn with nutritious forage throughout the year; shrubs during winter and both shrubs and forbs spring through fall. Small mammal diversity can be relatively high; seed eaters like the deer mouse are more common than herbivorous species such as voles.

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 may maintain big game winter range feeding value, although thermal cover will be reduced if the larger shrubs such as skunkbush sumac decline. Small mammal variety declines with the loss of vegetative diversity and litter cover.

Plant Community 3: Short Grasses & Sedges/ Half-shrubs: Pollinating insect diversity further declines as the forb community is simplified and soils become warmer and drier. Ground nesting bird habitat value is very poor and the loss of skunkbush sumac deprives other songbirds, such as the spotted towhee, of nesting habitat. The ubiquitous deer mouse may still thrive in this community but small mammal diversity in general declines significantly. Big game animals lose nutritional value on winter ranges with the loss of browse plants.

Plant Community 4: Half-shrubs/ Short Grasses/ Annual grasses and Forbs: Wildlife habitat value is very poor in general. Insects (i.e. grasshoppers) may be very abundant during population highs but species diversity, especially of pollinators, is very low. Amphibian habitat around seeps and springs is severely degraded. Reptiles, such as the short-horned lizard, may still occur but their formerly diverse food supply is reduced. Topographic diversity still provides some thermal cover for big game animals but nutritional value is very limited because the higher value browse plants are gone. Small mammals are represented by very few species. The deer mouse, a seed eater, may be relatively abundant.

8. Hydrology Data: The soils associated with this ecological site are generally in Hydrologic Soil Group B. The infiltration rates for these soils will normally be moderate. The runoff potential for this site is moderate, depending on slope and ground cover/health. Runoff curve numbers generally range from 76 to 94.

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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): 4
BLM–Soil & Vegetation Inventory Method (SVIM) Data: 2
NRCS–Range Condition Record (ECS-2): 10
NRCS–Range/Soil Correlation Observations & Soil 232 notes: 15
Ecological Site Reference: NRCS 417 No.: Sweetgrass County 518

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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Plant Community 1
HCPC
Sweetgrass County



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