

Ecological Site Description—Rangeland

Gravel (Gr), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central
R058AC055MT



1. Physiographic features: This ecological site can occur on outwash fans, hilltops, hills, plains, and terrace escarpments. It often occurs in a complex with other ecological sites. This site occurs on all exposures and aspect can sometimes be significant. Variations in plant composition and production can occur due to aspect.

Elevation (feet): 2,250–4,500

Landform: outwash fans, hilltops, hills, plains, terrace escarpments

Slope (percent): 0–70

Depth to Water Table (inches): greater than 60

Flooding: none

Ponding: none

Runoff Class: low to negligible

Aspect: all

2. Soils: These are moderately deep to very deep, droughty soils formed in sand and gravel deposits. They typically have greater than 15% pebbles and gravels in the upper part of the soil, and 50% or more pebbles, gravels, and cobbles in the lower part, often within 12 inches of the surface. Available Water Holding Capacity to 40 inches is less than 2 inches.

3. Associated sites: Silty, Silty–Steep, Sandy–Steep, and Shallow.

4. Similar sites: Very Shallow and Shallow to Gravel.

Very Shallow sites typically have a restrictive layer at less than 10 inches.

Shallow to Gravel sites are typically silt loams, loams and sandy loams less than 20 inches deep over gravels or a layer with 35% or more gravels.

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 a sparse grassland that is dominated by grasses and sedges with scattered shrub cover. Approximately 80–90% of the annual production is from grasses and sedges, 1–5% from forbs, and 5–15% is from shrubs and half-shrubs. The canopy cover of shrubs is 1–10%.

Dominant species include **bluebunch wheatgrass, plains muhly, and needleandthread**. Short grasses and sedges such as **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 **yucca, prairie rose, and Rocky Mountain juniper** can be common on some sites.

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/ Forbs/ Shrubs: This community occurs from shifts in climate or other disturbances. Dominants include **needleandthread, threadleaf sedge, and prairie junegrass**. Bluebunch wheatgrass 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 **green sagewort, hairy goldenaster, silverleaf scurfpea, and scarlet globemallow**. **Yucca and prairie rose** may increase on the site.

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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 Sedges/ Forbs/ Half-shrubs: This is a disturbance induced community, with dominants including **prairie junegrass, threadleaf sedge, perennial forbs and half-shrubs (Hood’s phlox, green and fringed sagewort)**. Remnant amounts of needleandthread may be present. Tall grasses and palatable forbs will be mostly absent. **Red or Fendler’s threawn** may invade the site.

Plant Community 4: Half-Shrubs/ Short Grasses and Sedges/Annual Grasses and Forbs: This community is the result of continual adverse disturbances. Dominants include **broom snakeweed, fringed and green sagewort, cheatgrass or Japanese brome, six-weeks fescue, Fendler’s threawn, and weedy forbs (thistles)**. Remnant amounts of **prairie junegrass, blue grama, and threadleaf sedge** may be present. Tall and medium grasses (needleandthread) and palatable forbs will be mostly absent. **Spotted knapweed** is a common invader onto this 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. These communities can respond positively to improved grazing management but it will take additional inputs to move them 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, droughty soils, such as those associated with this ecological site.

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

COVER TYPE	BASAL COVER (%)	CANOPY COVER (%)	AVERAGE HEIGHT (inches)
Cryptogams	T–5	0–5	0.25
Grasses/ sedges	3–10	20–30	18
Forbs	1–4	1–5	10
Shrubs	1–5	1–10	18
Litter	30–50		
Coarse fragments	15–35		
Bare ground	25–50		

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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%					500-560	600-675	700-788	800-900
Bluebunch wheatgrass	PSSP6	2	40–70		250-440	300-525	350-615	400-700
Needleandthread	HECOC8	10	10–20		62-125	75-150	88-175	100-200
Western or Thickspike wheatgrass	PASM ELLAL	14	0–5	5	0-30	0-38	0-44	0-50
Plains muhly *	MUCU3	3	0–5		-	0-38	0-44	0-50
Indian ricegrass	ORHY	2	0–20		0-125	0-150	0-175	0-200
Threadleaf sedge	CAFI	12	0–5)	10	0-30	0-38	0-44	0-50
Blue grama	BOGR2	15	0–5)					
Prairie junegrass	KOMA	12	0–5)					
Sandberg bluegrass	POSE	12	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%					6-30	8-38	9-44	10-50
Purple prairieclover	DAPU5	21	1–5)	5	0-30	0-38	0-44	0-50
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)					
Goldenrod spp.	SOLIDA	19	0–5)					
Cutleaf goldenweed	HASP	23	0–5)					
Aster spp.	ASTER	19	0–5)					
Green sagewort	ARDR4	19	0–5)					
Rush skeletonweed	LYJU	20	0–5)					
Stoneseed	LIRU4	24	0–5)					
Hood's phlox	PHHO	28	0–5)					
Stemless hymenoxys	HYAC	24	0–5)					
Stemmy goldenweed	HAMU	23	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)					
Douglas chaenactis	CHDO	24	0–5)					
Other native forbs	2FP		0–5)					
Twogrooved poisonvetch **	ASBI2	24	0–T)					
White point loco **	OXSE	24						
Larkspur spp. **	DELPH	24						
Death camas **	ZIGAD	32						
Shrubs and Half-shrubs 5–15%					30-94	38-112	44-130	50-150
Rubber rabbitbrush	ERNAN5	36	0–10	15	30-94 No more than 30 for any one	38-112 No more than 38 for any one	44-130 No more than 44 for any one	50-150 No more than 50 for any one
Skunkbush sumac	RHTR	33	0–5)					
Rocky Mountain juniper	JUSC	37	0–5)					
Fringed sagewort	ARFR4	38	0–5)					
Yucca	YUGL	37	0–5)					
Creeping juniper	JUHO2	38	0–T)					
Prairie rose	ROAR3	38	0–5)					
Other native shrubs	2SB		0–5)					
Broom snakeweed	GUSA2	37	0–T)	T	0–T	0–T	0–T	0–T
Plains pricklypear	OPPO	38	0–T)					
Total Annual Production (lbs./ac):					625	750	875	1000

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

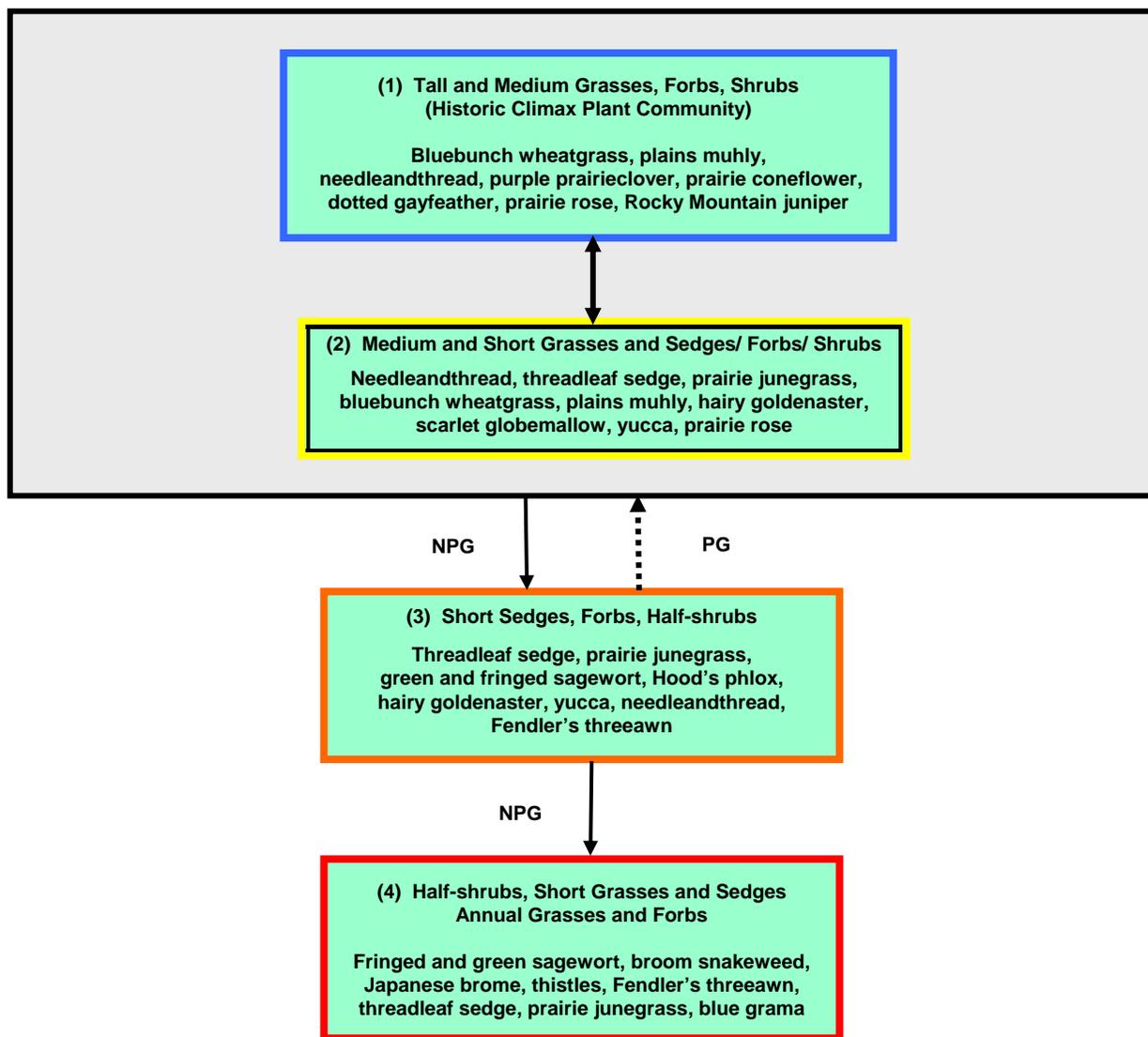
** These plants are poisonous to some grazing animals, during at least some portion of their life cycle.

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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.

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6. Livestock Grazing Interpretations: Managed livestock grazing is suitable on this site as it has the potential to produce a limited 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 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. Plant Community 4 has extremely limited forage production (< 150 lbs./acre), and a high percentage of non-preferred species for cattle and sheep.

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.

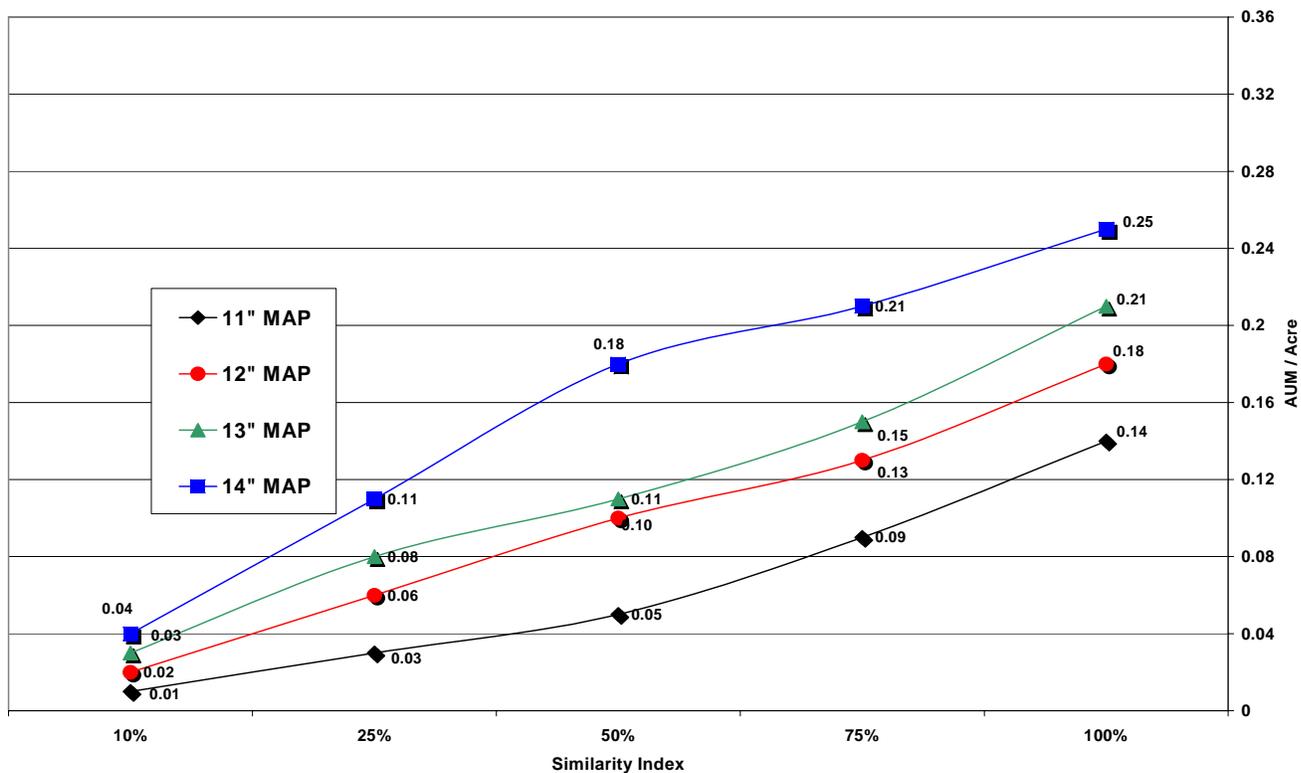
6a. Guide to Safe Stocking Rates: The following charts provide guidance for determining an initial safe stocking rate. Animal Unit Month (AUM) figures are based on averages of forage production from data collected for this site over several years. The characteristic plant communities and production values 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)
Gravel 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
1. Tall and Medium Grasses, Forbs, Shrubs (HCPC) <i>Bluebunch wheatgrass, plains muhly, needleandthread, purple prairieclover, prairie coneflower, dotted gayfeather, prairie rose, Rocky Mountain juniper</i> (S.I. >75%)	13–14"	875-1000	750-900 +	.20-.25 +	4.1-4.9	700-850 +	.19 –.23 +	4.3-5.2
	11–12"	625-750	525-675 +	.14-.18 +	5.4-7.0	500-625 +	.14-.17 +	5.9-7.3
2. Medium and Short Grasses and Sedges/ Forbs/ Shrubs <i>Needleandthread, threadleaf sedge, prairie junegrass, bluebunch wheatgrass, plains muhly, hairy goldenaster, scarlet globemallow, yucca, prairie rose</i> (S.I. 40–75%)	13–14"	480-750	300-650	.08-.18	5.6-12.2	325-675	.09-.18	5.4-11.3
	11–12"	345-560	200-475	.05-.13	7.7-18.3	225-500	.06-.14	7.3-16.3
3. Short Sedges, Forbs, Half-shrubs and Shrubs <i>Threadleaf sedge, prairie junegrass, green and fringed sagewort, Hood's phlox, hairy goldenaster, yucca, needleandthread, Fendler's threawn</i> (S.I. 20–40%)	13–14"	305-650	150-400	.04-.11	9.2-24.4	175-425	.05-.12	8.6-20.9
	11–12"	220-490	100-300	.03-.08	12.2-36.6	125-325	.03-.09	11.3-29.3
4. Half-shrubs, Short Grasses and Sedges, Annual Grasses and Forbs <i>Fringed and green sagewort, broom snakeweed, Japanese brome, thistles, Fendler's threawn, threadleaf sedge, prairie junegrass, blue grama</i> (S.I. < 20%)	11–14"	125-400	25-150	.01-.04	24.4-146.4	50-150	.01-.04	24.4-73.2

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: Because the Gravel 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. On southern and western exposures, rubber rabbitbrush, creeping and Rocky Mountain juniper and skunkbush sumac provide winter browse for mule deer and pronghorn. Skunkbush sumac and other shrubs provide breeding habitat for some song 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.

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/ Forbs/ 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 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 Sedges/ Half-shrubs and 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 and during summer and fall with the loss of desirable warm season grasses and forbs.

Plant Community 4: Half-shrubs /Short Grasses and Sedges/ 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. Habitat is very poor for most ground-nesting birds. Night hawks may nest on the uncovered gravel surface. 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 A. The infiltration rates for these soils will normally be rapid to very rapid. The runoff potential for this site is low, depending on slope and ground cover/health. Runoff curve numbers generally range from 49 to 79.

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9. Site Documentation:

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

Supporting Data for Site Development:

NRCS–Production and Composition Record for Native Grazing Lands (Range-417): 2

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

NRCS–Range Condition Record (ECS-2): 10

NRCS–Range/Soil Correlation Observations and Soil 232 notes: 15

Ecological Site Reference: NRCS 417 No.: Park 503

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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Gravel 11–14" MAP,
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Plant Community 1
HCPC
Park County



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



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