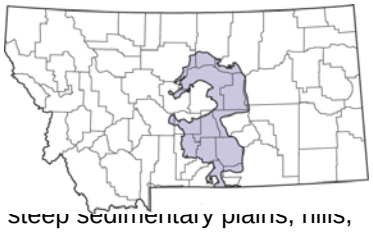
Ecological Site Description—Rangeland

Silty (Clayey, Sandy) Steep (SiStp), 11–14" MAP

MLRA: 58AC – Sedimentary Plains, Central
R058AC049MT



Formerly named and numbered the following:
Thin Silty (R058AC046MT); Thin Clayey (R058AC047MT); Thin Sandy (R058AC048MT)

1. Physiographic features: This ecological site occurs on moderately steep to steep sedimentary plains, hills, and hill slopes.

Landform: hill, plain, ridge
Elevation (feet): 2250 - 4500
Slope (percent): 15–45
Depth to Water Table (inches): greater than 60
Flooding: none
Ponding: none
Runoff Class: medium to high
Aspect: all, can be significant

2. Soils: These soils are moderately deep to very deep loamy, granular clayey, or sandy soils on steep or hilly landscapes. Permeability is mostly moderate with some being moderately slow, and effective rooting depth is greater than 20 inches. The major limitation to plant growth is the reduced effective moisture due to slope, and the potential for runoff. Available Water Holding Capacity to 40 inches is 4 to 8 inches on the silty and clayey soils, and 4 to 6 inches on the sandy soils.

3. Associated sites: This is a common ecological site in the Central Sedimentary Plains and can be associated with most of the other sites that occur here. The most common associated sites include Silty, Clayey, or Sandy and Shallow, as the Steep site often occurs as a transition between them. The site may occasionally also be in association with Shallow to Gravel, Sands, Shallow Clay, and Gravel.

4. Similar sites: Silty, Clayey, Sandy, Sands, Shallow, Shallow to Gravel, Shallow Clay.

The Silty, Clayey, Sandy, and Sands sites differ by being mainly on slopes less than 15%.

The Shallow and Shallow-to Gravel sites may have similar textures, but will be shallow (20 inches or less) to bedrock or semi-consolidated sedimentary beds.

The Shallow Clay site differs mainly by being 20 inches or less to shale or other root limiting material.

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 grassland dominated by cool and warm-season grasses with scattered shrub cover. Approximately 80–85% of the annual production is from grasses and sedges, 5–10% from forbs, and 5–10% is from shrubs and half-shrubs. The canopy cover of shrubs is 5 to 10%. Slight differences in production and plant species composition will occur depending on the surface texture of the site (silty, clayey, or sandy).

Plant Community 1A: Silty soils: Dominant species include **bluebunch wheatgrass, green needlegrass, western or thickspike wheatgrass, plains muhly, and needleandthread.** Short grasses such as **Sandberg bluegrass and prairie junegrass** also occur. 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 winterfat** are common.

Plant Community 1B: Clayey soils: Dominant species include **western wheatgrass, green needlegrass, and bluebunch wheatgrass.** Short grasses such as **Sandberg bluegrass and blue grama** also occur. There are abundant forbs **(purple and white prairie clovers, prairie coneflower, dotted gayfeather)** which occur in smaller percentages. **Nuttall's saltbush and winterfat** are the dominant shrubs.

Ecological Site Description—Rangeland Silty (Clayey, Sandy) Steep (SiStp), 11–14" MAP

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Plant Community 1C: Sandy soils: Dominant species include **prairie sandreed, Indian ricegrass, bluebunch wheatgrass, thickspike wheatgrass, and needleandthread. Threadleaf sedge and sand dropseed** also occur. There are abundant forbs **(purple and white prairie clovers, prairie coneflower, dotted gayfeather)** which occur in smaller percentages. **Skunkbush sumac and yucca** are the dominant shrubs.

These plant communities are well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and the presence of tall, deep-rooted perennial grasses allows for moderately high drought tolerance, considering the limited available water holding capacity of the site. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable precipitation. 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/ Shrubs and Half-shrubs: This community is the result of shifts in climate and disturbances such as grazing. Dominants include **needleandthread, western/ thickspike wheatgrass, sedges, threadleaf sedge, blue grama, and prairie junegrass**. Bluebunch wheatgrass, green needlegrass, and prairie sandreed (sandy soils) will still be present but in smaller amounts. There may be an increase in the amount of **fringed sagewort, Wyoming big sagebrush, or yucca.** Palatable and nutritious forbs will be replaced by less desirable and more aggressive species.

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 and Medium Grasses/ Half-shrubs and Shrubs: This is a disturbance induced community, with dominants including **threadleaf sedge, prairie junegrass, blue grama, Sandberg bluegrass, 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. Red threeawn, broom snakeweed, yucca, and annual grasses may begin to invade the site.

Plant Community 3 is much less productive than Plant Communities 1 or 2, and has 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: Short Grasses/ Annual Grasses and Forbs/ Half-Shrubs: This community is the result of continual adverse disturbances. Dominants include **Japanese brome, threadleaf sedge, prairie junegrass, blue grama, red threeawn, fringed sagewort, broom snakeweed, and weedy forbs.**

Plant community 4 has extremely reduced production of native plants (< 600 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 annual invaders a competitive advantage over the cool season 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 towards a higher successional stage and a more productive plant community.

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

COVER TYPE	BASAL COVER (%)	CANOPY COVER (%)	AVERAGE HEIGHT (inches)
Cryptogams	T–2	0–3	0.25
Grasses/ sedges	5–12	50–80	24
Forbs	1–4	1–10	6
Shrubs	1–4	1–15	24
Litter	40–60		
Coarse fragments	0–15		
Bare ground	15–30		

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

(NOTE: Because of the hilly landscape associated with this ecological site, there will often be small included areas that receive additional moisture (i.e., from snow accumulation) where shrubs such as snowberry will be abundant).

Common Name	Plant Symbol	Plant Group	Percent Comp.	Group Max. %	Mean Annual Precipitation (inches)			
					11 (lbs./acre)	12 (lbs./acre)	13 (lbs./acre)	14 (lbs./acre)
Grasses and Sedges				**80–85%**	**880-935**	**960-1020**	**1040-1105**	**1120-1190**
Bluebunch wheatgrass	PSSP6	2	40–60		440-660	480-720	520-780	560-840
Green needlegrass	NAVI4	2	5–20		55-220	60-240	65-260	70-280
Western or Thickspike wheatgrass	PASM ELLAL	14	0–10	10	0-110	0-120	0-130	0-140
Needleandthread	HECOC8	10	5–15		55-165	60-180	65-195	70-210
Plains muhly *	MUCU3	3	0–5		-	0-60	0-65	0-70
Prairie sandreed **	CALO	5	0-30		0-330	0-360	0-390	0-420
Indian ricegrass **	ORHY	2	0-15		0-165	0-180	0-195	0-210
Bottlebrush squirreltail	ELEL5	10	0-5		0-55	-	-	-
Threadleaf sedge	CAFI	12	0–5}	10	11-110 No more than 55 for any one	12-120 No more than 60 for any one	13-130 No more than 65 for any one	14-140 No more than 70 for any one
Needleleaf sedge	CADU6	16	0–5}					
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}	0–T	0–T	0–T	0–T	0–T
Forbs				**5–10%**	**55-110**	**60-120**	**65-130**	**70-140**
Purple or white prairieclover	DAPU5	21	1–5}	10	11-110 No more than 55 for any one	12-120 No more than 60 for any one	13-130 No more than 65 for any one	14-140 No more than 70 for any one
Dotted gayfeather	LIPU	21	1–5}					
Scurfpea spp.	PSAR	23	0–5}					
Hairy goldenaster	HEVI4	23	0–5}					
Prairie thermopsis	THRH	20	0–5}					
American vetch	VIAM	18	0–5}					
Wild onion	ALLIU	32	0–5}					
Milkvetch spp.	ASTRA	24	0–5}					
Hood's phlox	PHHO	28	0–5}					
Western yarrow	ACMI2	19	0–5}					
Biscuitroot spp.	LOMAT	24	0–5}					
Scarlet globemallow	SPCO	20	0–5}					
Blue flax	LIPEL	28	0-5}					
Buckwheat spp.	ERIOG	23	0-5}					
Green sagewort	ARDR4	19	0–5}					
Pussytoes spp.	ANTEN	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						
Shrubs and Half-shrubs				**5–10%**	**55-110**	**60-120**	**65-130**	**70-140**
Winterfat	KRLA2	35	0–5}	10	11-110 No more than 55 for any one	12-120 No more than 60 for any one	13-130 No more than 65 for any one	14-140 No more than 70 for any one
Wyoming big sagebrush	ARTRW8	37	0–5}					
Nuttall's saltbush ****	ATNU2	34	0-5}					
Yucca **	YUGL	37	0-5}					
Prairie rose	ROAR3	38	0–5}					
Fringed sagewort	ARFR4	38	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./acre):			**100%**		**1100**	**1200**	**1300**	**1400**

***** This plant tends to occur mainly in the higher precipitation areas of this Range Resource Unit. ** These plants are most likely to occur on soils with sandy surface textures. *** These plants are poisonous to some grazing animals, during at least some portion of their life cycle. **** This plant tends to occur mainly in 11 & 12" precipitation areas of this Range Resource Unit.

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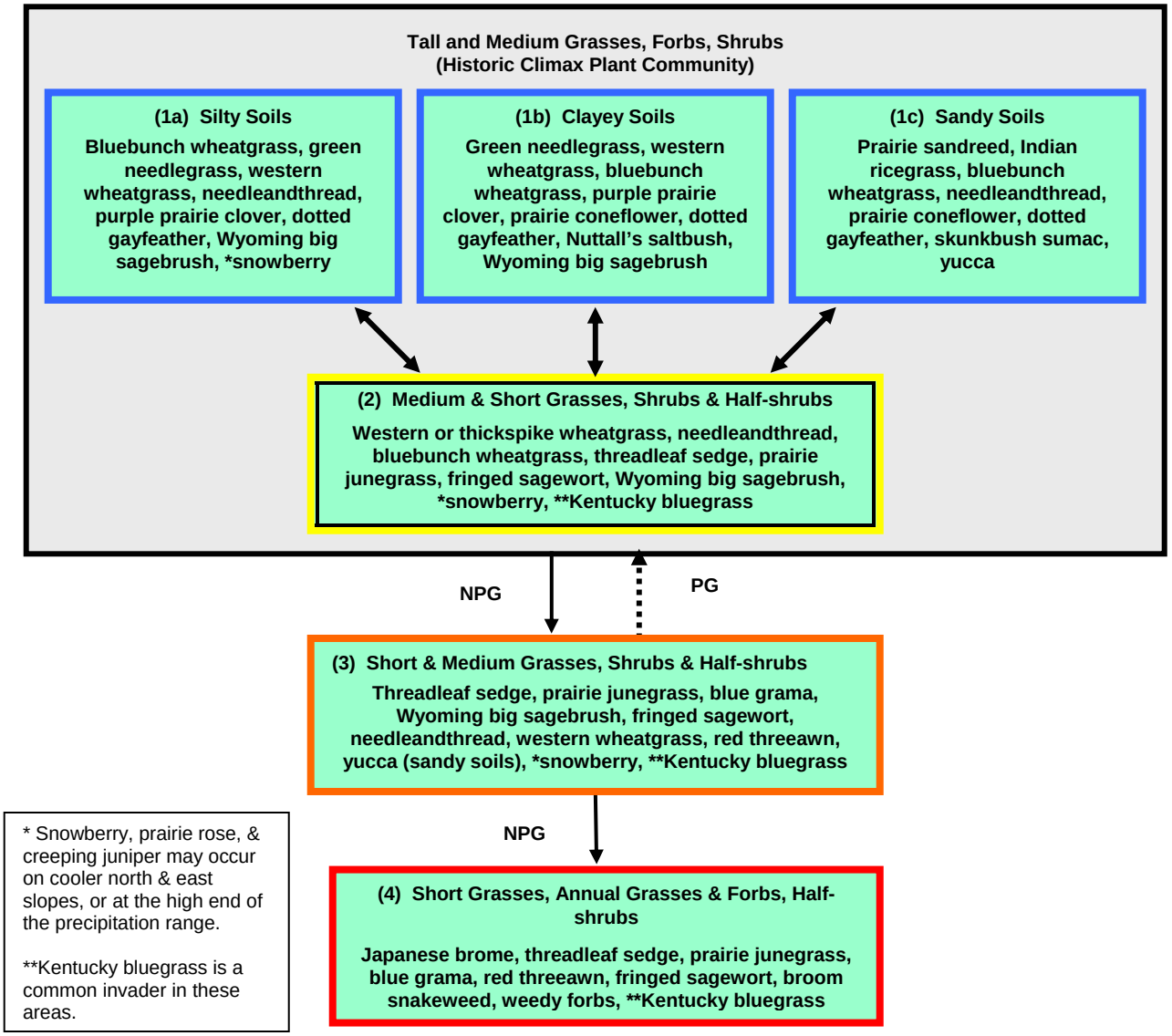
5c. Plant Communities and Transitional Pathways (diagram)



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 moderate amount of high quality forage. Forage production is somewhat limited by steep slopes and the potential for runoff, reducing 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. Non-prescribed grazing over a period of years will be detrimental to the site as it will alter the plant community composition and productivity.

Whenever Plant Community 2 (Medium and short grasses) occurs, grazing management strategies need to be implemented to avoid further deterioration. These communities are still stable, productive, and healthy provided they receive proper management. These communities will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move these communities 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.

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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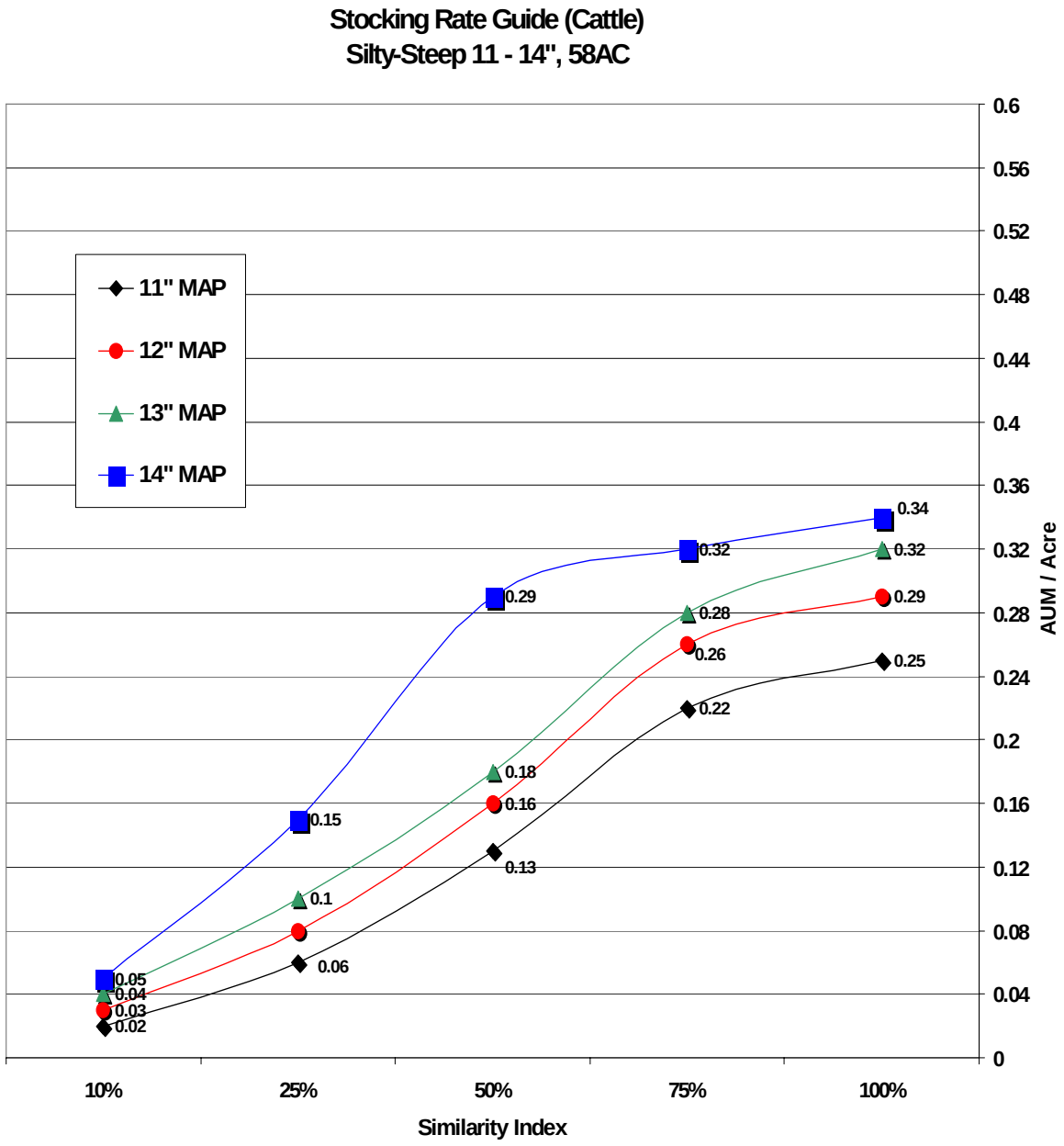

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6b. Stocking Rate Guide:

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
1A, 1B, 1C. Tall and Medium Grasses, Forbs, Shrubs (HCPC) *Bluebunch wheatgrass, green needlegrass, prairie sandreed, western wheatgrass, needleandthread, dotted gayfeather, purple prairieclover, Wyoming big sagebrush, winterfat, Nuttall's saltbush* **(S.I. >75%)**	13–14"	1300-1400	1100-1250+	.30 –.34+	2.9-3.3+	1050-1200+	.29–.33+	3.1-3.5+
	11–12"	1100-1200	925-1075+	.25 –.29+	3.4-4.0+	875-1025+	.24–.28+	3.6-4.2+
2. Medium & Short Grasses, Shrubs & Half-shrubs *Western wheatgrass, needleandthread, bluebunch wheatgrass, threadleaf sedge, prairie junegrass, fringed sagewort, Wyoming big sagebrush, *snowberry, **Kentucky bluegrass* **(S.I. 40–75%)**	13–14"	715-1190	425-1075	.12 –.29	3.4-8.6	425-1000	.12 –.27	3.7-8.6
	11–12"	605-1020	375-925	.10 –.25	4.0-9.8	375-875	.10 –.24	4.2-9.8
3. Short & Medium Grasses, Half-shrubs & Shrubs *Threadleaf sedge, prairie junegrass, blue grama, Wyoming big sagebrush, fringed sagewort, needleandthread, western wheatgrass, red threeawn, yucca *snowberry, **Kentucky bluegrass* **(S.I. 20–40%)**	13–14"	520-980	250-550	.07 –.15	6.7-14.6	275-675	.08 –.18	5.4-13.3
	11–12"	440-840	225-450	.06 –.12	8.1-16.3	250-600	.07 –.16	6.1-14.6
4. Short Grasses, Annual Grasses & Forbs, Half-shrubs *Japanese brome, threadleaf sedge, prairie junegrass, blue grama, red threeawn, fringed sagewort, broom snakeweed, weedy forbs, **Kentucky bluegrass* **(S.I. < 20%)**	13–14"	220-560	50-200	.01 –.05	18.3-73.2	75-225	.02 –.06	16.3-48.6

* Snowberry, prairie rose, & creeping juniper may occur on cooler north & east slopes, or at the high end of the precipitation range.
**Kentucky bluegrass is a common invader in these areas.

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 Silty-Steep ecological site often adds topographical and vegetative complexity to an otherwise fairly uniform landscape. This provides for increased variety of wildlife habitat niches and cover types. The general area offers 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 (i.e. on rock outcrops) attract a variety of raptors. Golden eagles often hunt low to the ground along the steep side hills characteristic of this site where they can surprise small mammals as they cruise over small drainages. Noxious weeds, such as spotted knapweed and leafy spurge, commonly reduce vegetative diversity of the Silty-Steep ecological site. The interface of sandy and shale geologic substrates may result 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, mountain bluebirds and golden eagles are examples of birds using this community. The high proportion of grasses and grass-like plants supports grazers and mixed feeders such as bison and elk. A diversity of forbs and shrubs provides for browsers and selective feeders such as mule deer and pronghorn. Large animal nutrition levels are relatively high 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 Gardner saltbush and winterfat are available. Small mammal diversity may be fairly high as a result of complex plant structural variety and ample litter cover. Example species include the kangaroo rat, deer mouse, meadow vole, olive-backed pocket mouse and desert cottontail.

Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs: Pollinating insect diversity declines with the decrease in flowering plant variety and litter cover. Reptile populations are probably similar to the PPC. Trampling and over-grazing of seep areas degrades amphibian habitat. Ground nesting bird habitat value declines with the reduction in litter cover and residual plant material in spring. Structural habitat diversity for birds in general declines with the reduction in taller grasses and forb variety. Winter range value for big game is similar to the PPC as an increase in fringed sagewort and possibly big sagebrush partially compensate for some reduction in winterfat and Nuttall saltbush. Seed eating small mammals, such as the deer mouse, may be abundant; herbivorous rodents, like voles, are adversely affected by a loss of litter cover.

Plant Community 3: Short and Medium Grasses/ 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. The ubiquitous deer mouse may still thrive in this community but small mammal diversity in general declines significantly. Big game animals lose a nutritional value on winter ranges with the loss of nutritious browse plants like winterfat, although an increase in big sagebrush on heavier soils may partially compensate in some areas. Seeps and springs are severely degraded from livestock trampling with a resulting loss of biodiversity in general and amphibian habitat specifically.

Plant Community 4: Short Grasses/ Annual grasses and Forbs/ Half-shrubs: 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: Silty and Clayey soils: The runoff potential for this site is high to very high, depending on slope and ground cover. Runoff curve numbers generally range from 77 to 92. The soils associated with this ecological site are generally in Hydrologic Soil Group C or D. The infiltration rates for these soils will normally be moderate to moderately slow.

Sandy soils: The soils associated with this ecological site are generally in Hydrologic Soil Group B. The infiltration rates for these soils will normally be moderate, to moderately rapid. The runoff potential for this site is low to high depending on slope and ground cover/health. Runoff curve numbers generally range from 65 to 83.

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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): 5

BLM–Soil & Vegetation Inventory Method (SVIM) Data: 10

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

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

Ecological Site Reference: NRCS 417 No.: Wheatland County 507, Sweetgrass County 507

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 10/22/2004

State Rangeland Management Specialist **Date**

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Silty-Steep, 11–14” MAP,
Sedimentary Plains, Central
Plant Community 1
HCPC
Wheatland County
Bluebunch wheatgrass–60%

Silty-Steep, 11–14” MAP,
Sedimentary Plains, Central
Plant Community 1
HCPC

Silty-Steep, 11–14” MAP,
Sedimentary Plains, Central
Plant Community 1
HCPC
Wheatland County

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Silty-Steep, 11–14” MAP, Sedimentary Plains, Central Plant Community 1 to 2

Silty-Steep, 11–14” MAP, Sedimentary Plains, Central Plant Community 1 to 2 Meagher County

Silty-Steep, 11–14” MAP, Sedimentary Plains, Central Plant Community 2 Sweetgrass County Bluebunch wheatgrass, needleandthread

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Silty-Steep, 11–14” MAP,
Sedimentary Plains, Central
Plant Community 2
Sweetgrass County

Silty-Steep, 11–14” MAP,
Sedimentary Plains, Central
Plant Community 3
Golden Valley County
Bluebunch wheatgrass, Wyoming big sagebrush