

Ecological Site Description—Rangeland

Clayey–Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
 MLRA: 60B – Pierre Shale Plains, East
 R058AE005MT, R060BE583MT

Site Name: Clayey–Steep (CyStp), 10–14 inches Mean Annual Precipitation (MAP) (FORMERLY THIN CLAYEY)

Site Number: R058AE005MT, R060BE583MT

Major Land Resource Areas: 58A – Northern Rolling High Plains, North Part
 60B – Pierre Shale Plains, North Part

Rangeland Resource Units: 58AE – Sedimentary Plains, East
 60BE – Pierre Shale Plains, East

1. Physiographic Features: This ecological site occurs on moderately steep to steep sedimentary plains, hills, and along narrow ridges. Slopes are mainly between 15 and 45%. This site occurs on all exposures. The influence of aspect can be significant and slight variations in plant community composition and production may result. Runoff potential and potential for water erosion are important features of this site.

Elevation (feet): 1,900–3,500

Landform: hill, plain, ridge

Slope (percent): 15–45

Depth to Water Table (inches): greater than 60

Flooding and Ponding: none

Runoff Class: high to very high

Aspect: all aspects

2. Climatic Features: MLRAs 58A and 60B are considered to have a continental climate characterized by cold winters, hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are typical. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains and the winds move freely across the plains and account for rapid changes in temperature. Seasonal precipitation is often limiting for plant growth. Annual fluctuations in species composition and total production are typical depending on the amount and timing of rainfall. See Climatic Data Sheet MLRA 58A, east and 60B, for more details (Section II of the NRCS Field Office

Technical Guide). For local climate station information, refer to <http://www.wcc.nrcs.usda.gov>.

Frost-free period (32° F)-days: 105–145

Freeze-free period (28° F)-days: 125–170

Mean annual precipitation (inches): 10–14

3. Influencing Water Features: None

4. Associated sites: Mainly Clayey, Shallow Clay, and Shallow. Occasionally also Silty, Silty–Steep, Shallow to Gravel, and Sands.

5. Similar sites: Clayey, Shallow Clay, Silty–Steep.

The Clayey site differs mainly by being on slopes of less than 15%.

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

The Silty–Steep site differs mainly in surface texture, being more loamy or silty.

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6. Soils: These soils are moderately deep to very deep (more than 20 inches deep) granular clayey soils on moderately steep, steep or hilly landscapes. They are over 20 inches deep to any root limiting property. The major limitation to plant growth is reduced effective moisture due to the high potential for runoff.

Parent material (kind): residuum, alluvium, colluvium

Parent material (origin): semiconsolidated shale, sometimes interbedded with siltstone or thin layers of sandstone.

Surface textures: clay loam, silty clay loam, silty clay, clay

Subsurface Fragments ≤ 3 " (% volume): 0–25

Subsurface Fragments > 3 " (% volume): 0–20

Depth (inches): greater than 20

Soil surface permeability (inches per hour): moderate (0.6–2.0) to moderately slow (0.2–0.6)

Available Water Holding Capacity to 40" (inches): 4.0–7.5

Drainage Class: well

Surface Salinity/Electrical Conductivity (mmhos/cm): non-saline to very slightly saline (0–4)

Surface Sodium Absorption Ratio (SAR): 0–4

Surface Reaction (pH) (1:1 water): neutral to moderately alkaline (6.6–8.4)

6a. Representative Soils: Listed below are soils and map units which characterize this site in various counties. (Reference MT-165, Soil Interpretive Rating Report).

| COUNTIES | REPRESENTATIVE SOILS | MAP UNIT |
|---------------|-----------------------------------|--------------------|
| Big Horn | Brussett silty clay loam (Regent) | AVc, WI |
| Carter | Bascovy clay | 24 |
| Custer | Abor silty clay | 43F, 991F |
| Dawson | Bascovy silty clay loam (Dimyaw) | Cm, Lm, By |
| Garfield | Bascovy silty clay | 203F |
| McCone | Bascovy silty clay | 115 |
| Musselshell | Orinoco silty clay loam | 167E |
| Prairie | Abor silty clay | 1, 98 |
| Richland | Bascovy silty clay loam (Dimyaw) | DmD, LfF |
| Rosebud (60B) | Abor silty clay | 142, 143, 144, 200 |
| Treasure | Kobar clay loam | Hr |

7. Plant Community and Species Composition: The physical aspect of this site in Historical Climax is that of a steeply sloping grassland dominated by cool and warm season grasses, with forbs and shrubs occurring in smaller percentages. Approximately 60–75% of the annual production by weight is from grasses and sedges, 5–10% is from forbs, and 10–15% is from shrubs, half-shrubs, and cacti. Canopy cover of shrubs is typically 5–10%. Trees are not significant on this site.

TABLE 7a.—Major Plant Species Composition, lists plant species composition and production by dry weight for the Historic Climax (HCPC) or Potential Plant Community (PPC) for this site. The Historic Climax or Potential Plant community has been determined by the study of rangeland relict areas, exclosures, or areas protected from excessive grazing. Total annual production has been derived from several data sources, and has been adjusted to represent a typical annual moisture cycle for the site. Reference for plant species names and symbols: USDA–NRCS PLANTS Database at <http://plants.usda.gov>.

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7a. Major Plant Species Composition – Historic Climax/Potential Plant Community

| Common Name | Plant Symbol | Plant Group | Percent Comp. | Group Max. % | Mean Annual Precipitation (MAP) (inches) | | | | |
|--|--------------|-------------|---------------|--------------|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| | | | | | 10 | 11 | 12 | 13 | 14 |
| | | | | | (lbs./acre) | (lbs./acre) | (lbs./acre) | (lbs./acre) | (lbs./acre) |
| Grasses and Grasslikes 60–75% | | | | | 600 | 713 | 825 | 938 | 1050 |
| Western wheatgrass | PASM | 14 | 15-20 | 10 | 120-160 | 143-190 | 165-220 | 188-250 | 210-280 |
| Green needlegrass | NAVI | 2 | 10-35 | | 80-280 | 95-333 | 110-385 | 125-438 | 140-490 |
| Little bluestem | ANSC10 | 1 | 10-25 | | 80-200 | 95-238 | 110-275 | 125-312 | 140-350 |
| Sideoats grama* | BOCU | 3 | 10-20 | | 80-160 | 95-190 | 110-220 | 125-250 | 140-280 |
| Bluebunch wheatgrass** | PSSP6 | 2 | 10-40 | | 80-320 | 95-380 | 110-440 | 125-500 | 140-560 |
| Thickspike wheatgrass | ELLAL | 14 | 1-5 | | 8-40 | 10-48 | 11-55 | 12-62 | 14-70 |
| Plains muhly | MUCU3 | 3 | 1-5 | | 8-40 | 10-48 | 11-55 | 12-62 | 14-70 |
| Threadleaf sedge | CAFI | 12 | 1-5 | | 8-80 No More than 40 for any one | 10-95 No more than 48 for any one | 11-110 No more than 55 for any one | 12-125 No more than 62 for any one | 14-140 No more than 70 for any one |
| Blue grama | BOGR2 | 15 | 1-5 | | | | | | |
| Prairie junegrass | KOMA | 12 | 1-5 | | | | | | |
| Sandberg bluegrass | POSE | 12 | 1-5 | | | | | | |
| Needleandthread | HECOC8 | 10 | 1-5 | | | | | | |
| Plains reedgrass | CAMO | 16 | 1-5 | | | | | | |
| Buffalograss | BUDA | 15 | 0-5 | | | | | | |
| Needleleaf sedge | CADU6 | 16 | 0-5 | | | | | | |
| Alkali sacaton | SPAI | 1 | 0-5 | | | | | | |
| Montana wheatgrass | ELAL7 | 14 | 0-5 | | | | | | |
| Other native grasses | 2GP | | 1-5 | | | | | | |
| Tumblegrass | SCPA | 9 | 0-T | T | T | T | T | T | |
| Red threeawn | ARPUL | 11 | 0-T | | | | | | |
| Forbs 5–10% | | | | | 80 | 95 | 110 | 125 | 140 |
| Black samson | ECPA | 21 | 1-5 | 10 | 8-80 No More than 40 for any one | 10-95 No more than 48 for any one | 11-110 No more than 55 for any one | 12-125 No more than 62 for any one | 14-140 No more than 70 for any one |
| Scurfpea spp. | PSORA2 | 23 | 1-5 | | | | | | |
| Purple prairieclover | DAPU5 | 21 | 1-5 | | | | | | |
| White prairieclover | DACA7 | 21 | 1-5 | | | | | | |
| Prairie coneflower | RACO3 | 23 | 1-5 | | | | | | |
| Dotted gayfeather | LIPU | 21 | 1-5 | | | | | | |
| American vetch | VIAM | 18 | 1-5 | | | | | | |
| Milkvetch spp. | ASTRA | 24 | 1-5 | | | | | | |
| Hood's phlox | PHHO | 28 | 1-5 | | | | | | |
| Wild parsley | MUDI | 24 | 1-5 | | | | | | |
| Green sagewort | ARDR4 | 19 | 1-5 | | | | | | |
| Scarlet globemallow | SPCO | 20 | 1-5 | | | | | | |
| Pussytoes spp. | ANTEN | 20 | 1-5 | | | | | | |
| Other native forbs | 2FP | | 1-5 | | | | | | |
| Twogrooved poisonvetch | ASBI2 | 24 | 0-T | T | T | T | T | T | T |
| White point loco | OXSE | 24 | 0-T | | | | | | |
| Larkspur spp. | DELPH | 24 | 0-T | | | | | | |
| Death camas spp. | ZIGAD | 32 | 0-T | | | | | | |
| Shrubs, Half-shrubs, and Cacti 10–15% | | | | | 120 | 142 | 165 | 187 | 210 |
| Winterfat | KRLA2 | 35 | 1-5 | 5 | 7-32 | 9-44 | 11-55 | 12-62 | 14-70 |
| Nuttall's saltbush | ATNU2 | 34 | 1-5 | 5 | 7-32 | 9-44 | 11-55 | 12-62 | 14-70 |
| Prairie rose | ROAR3 | 38 | 1-5 | 15 | 8-120 No more than 40 for any one | 10-142 No more than 48 for any one | 11-165 No more than 55 for any one | 12-187 No more than 62 for any one | 14-210 No more than 70 for any one |
| Fringed sagewort | ARFR4 | 38 | 1-5 | | | | | | |
| Silver sagebrush | ARCA13 | 36 | 1-5 | | | | | | |
| Wyoming big sagebrush | ARTRW8 | 37 | 1-5 | | | | | | |
| Green rabbitbrush | CHVI8 | 36 | 0-5 | | | | | | |
| Rubber rabbitbrush | ERNAN5 | 36 | 0-5 | | | | | | |
| Greasewood | SAVE4 | 37 | 0-5 | | | | | | |
| Rocky Mtn. Juniper | JUSC2 | 37 | 0-5 | | | | | | |
| Other native shrubs | 2SB | | 1-5 | | | | | | |
| Broom snakeweed | GUSA2 | 37 | 0-T | | | | | | |
| Plains pricklypear | OPPO | 38 | 0-T | | | | | | |
| Total Annual Production (lbs./acre) | | | 100% | | 800 | 950 | 1100 | 1250 | 1400 |

* Typically occurs on north aspects.

** This species tends to increase in the western part of the Rangeland Resource Unit.

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

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7b. Plant Group Descriptions: Plant functional groups are based on: season of growth, growth form, stature, type of root system, and ecological response to disturbance. Refer to Field Office Technical Guide (FOTG) Section II for a complete description of plant groups.

8. Total Annual Production: Total annual production is a measurement of the total aboveground production (dry weight) of all major plant species that occur on the site during a single growth year, regardless of accessibility to grazing animals. This information is listed at the bottom of TABLE 7a.—Major Plant Species Composition. Average production values are listed for each incremental inch of precipitation for the site.

9. Cover and structure: The following table shows the approximate amounts of basal cover, canopy cover, and plant heights for this site in the Historic Climax or Potential Plant Community.

| COVER TYPE | BASAL COVER (%) | CANOPY COVER (%) | AVERAGE HEIGHT (inches) |
|------------------|-----------------|------------------|-------------------------|
| Cryptogams | 0 – T | 0 – T | 0.25 |
| Grasses/sedges | 6 – 10 | 55 – 70 | 24 |
| Forbs | 1 – 3 | 1 – 5 | 18 |
| Shrubs | 1 – 3 | 5-10 | 24 |
| Litter | 20-40 | | |
| Coarse fragments | 0 – 4 | | |
| Bare ground | 20-40 | | |

10. Ecological Dynamics: This site developed under Northern Great Plains climatic conditions, which included the natural influence of large herbivores and occasional fire. The plant community upon which interpretations are primarily based is the Historic Climax Plant Community (HCPC) or Potential Plant Community. This plant community is described as a reference to understand the original potential of this site, and is not always considered to be the management goal for every acre of rangeland. The following descriptions should enable the landowner or manager to better understand which plant communities occupy their land, and assist with setting goals for vegetation management. It can also be useful to understand the environmental and economic values of each plant community.

This site is considered moderately resilient to disturbance as it has only moderate soil limitations (slope) for plant growth. Changes may occur to the Historic Climax Plant Community due to management actions and/or climatic conditions. Under continued adverse impacts, a moderate to extreme decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments, this site can more readily return to the Historic Climax Plant Community (HCPC).

Continual adverse impacts to the site over a period of years results in a departure from the HCPC, with a decrease of the taller, more palatable species such as **western wheatgrass, bluebunch wheatgrass, green needlegrass, little bluestem, and sideoats grama** will occur. These plants will be replaced by a mixture of short grasses and sedges, including **Sandberg bluegrass, blue grama, threadleaf sedge, several species of non-palatable forbs, broom snakeweed, and Wyoming big sagebrush. Greasewood** may replace Wyoming big sagebrush in MLRA 60B, Pierre Shales.

Continued deterioration results in an abundance of **short grasses, annual grasses, annual forbs, and cacti**. Plants that are not a part of the Historic Climax Plant Community that are most likely to invade are annual grasses (**cheatgrass, Japanese brome**), and **annual and biennial forbs**.

Long-term non-use (>3 years) combined with the absence of fire will result in excessive litter and decadent plants in the bunchgrass communities at higher precipitation zones, 12–14 inches.

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10a. Major Plant Community Types: Following are descriptions of some of the common plant communities that may occupy this site.

Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs: This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) or Potential Plant Community (PPC) for this site. This plant community contains a high diversity of tall and medium height, cool and warm season grasses (**western wheatgrass, bluebunch wheatgrass** (western portion of RRU), **green needlegrass, little bluestem, sideoats grama**), and short grasses and sedges (**plains muhly, prairie junegrass, threadleaf sedge, and blue grama**). There are abundant forbs, shrubs, and half-shrubs (**Nuttall's saltbush, winterfat**) which occur in small percentages.

This plant community is 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 high drought tolerance. 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. Run-off from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship. This plant community provides for soil stability and a functioning hydrologic cycle.

Plant Community 2: Medium and Short Grasses/ Medium Shrubs: Slight variations can result in a community similar to the HCPC/PPC but with higher proportions of medium and short grasses, such as **western wheatgrass, Sandberg bluegrass, blue grama, and threadleaf sedge**. The tall, more palatable grasses (green needlegrass, little bluestem, bluebunch wheatgrass) will be present in smaller percentages. There may be an increase in the amount of **Wyoming big sagebrush** and a corresponding decrease in winterfat and Nuttall's saltbush. Palatable and nutritious forbs will be replaced by less desirable and more aggressive species.

Grass biomass production and litter become reduced on the site as the taller grasses disappear, 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/ Medium Shrubs/ Annuals & Biennials/ Cacti: With continued heavy disturbance the site will become dominated by short grasses, such as **blue grama, Sandberg bluegrass, prairie junegrass, and threadleaf sedge, plus Wyoming big sagebrush, annuals, and biennials**. The taller grasses will occur only occasionally. Palatable shrubs and forbs will be mostly absent. Annuals and biennials, such as **cheatgrass and curlycup gumweed**, will be more abundant.

This plant community is less productive than Plant Community 1 or 2. The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and high evaporation, which gives blue grama 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.

This community will respond positively to improved grazing management, but significant economic inputs and time would be required to move this plant community toward a higher successional stage and a more productive plant community.

Plant Community 4: Annual Grasses/ Medium and Short Perennial Grasses: Fire will often cause Plant Community 2 to lose the brush component. Medium and short grasses will dominate the community (**western wheatgrass and blue grama**), and **annual grasses, including cheatgrass**, will be present for a period of time after fire. **Green needlegrass** will often respond if it was present under the sagebrush canopy prior to the fire.

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This plant community is less productive than the HCPC 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 may take additional inputs to move it towards a community similar in production and composition to that of Plant Community 1 or 2.

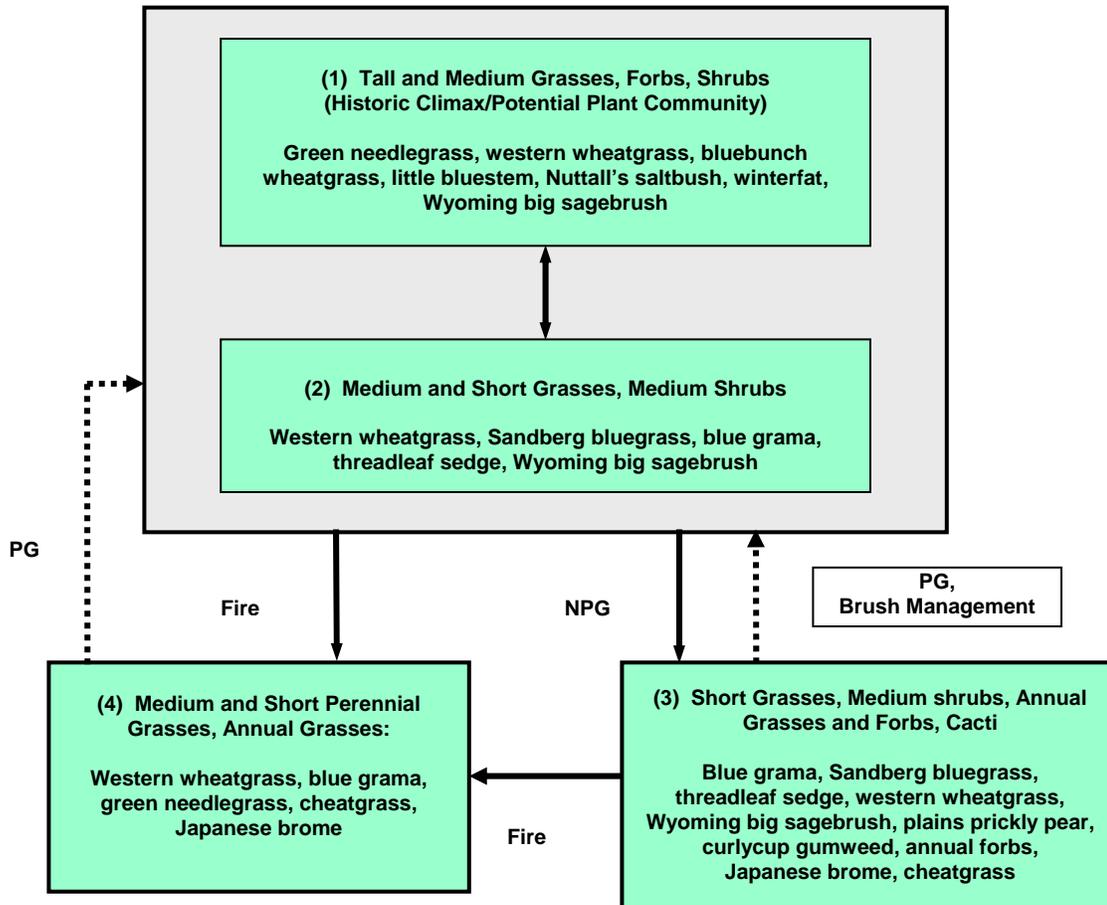
10b. Plant Communities and Transitional Pathways (State and Transition Model): Transitions in plant community composition occur along a gradient that is not linear. Many processes are involved in the changes from one community to another. Changes in climate, elevation, soils, landform, fire patterns and frequency, and grazing all play a role in determining which of the plant communities will be expressed. The following model outlines the various plant communities that may occur on this site and provides a diagram of the relationship between plant community and type of use or disturbance.

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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.

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: Non-prescribed wildfire.

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11. Plant Growth Curves: Growth of native cool-season plants begins in April and continues to the end of June. Native warm-season plants begin growth about mid May and continue to about the end of August. Green up of cool-season plants can occur in September through October when adequate soil moisture is present. The following tables show the approximate percentage of total growth by month that is expected to occur in various plant communities on this site for a "typical" moisture year.

Growth Curve Number: MT0808

Growth Curve Description: Includes all sedimentary plains sites with deep, clayey textured upland soils and cool season grasses.

Totals for Each Month

| Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| 0 | 0 | 0 | 25 | 30 | 30 | 5 | 5 | 5 | 0 | 0 | 0 |

Cumulative Totals by Month

| Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| 0 | 0 | 0 | 25 | 55 | 85 | 90 | 95 | 100 | 0 | 0 | 0 |

Growth Curve Number: MT0810

Growth Curve Description: Includes all upland sites in eastern sedimentary plains having deep soils and mainly warm season plants.

Totals for Each Month

| Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| 0 | 0 | 0 | 5 | 15 | 40 | 25 | 10 | 5 | 0 | 0 | 0 |

Cumulative Totals by Month

| Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| 0 | 0 | 0 | 5 | 20 | 60 | 85 | 95 | 100 | 0 | 0 | 0 |

Growth Curve Number: MT0813

Growth Curve Description: Includes all low condition sites in eastern sedimentary plains, dominated by short grasses.

Totals for Each Month

| Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| 0 | 0 | 0 | 25 | 25 | 25 | 10 | 10 | 5 | 0 | 0 | 0 |

Cumulative Totals by Month

| Jan | Feb | Mar | April | May | June | July | Aug | Sept | Oct | Nov | Dec |
|-----|-----|-----|-------|-----|------|------|-----|------|-----|-----|-----|
| 0 | 0 | 0 | 25 | 50 | 75 | 85 | 95 | 100 | 0 | 0 | 0 |

12. 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. 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 to one more similar to potential if a good seed source of the taller grasses still exists.

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Once this site is occupied by either Plant Community 3 or 4, it will be more difficult to restore it 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.

The potential for seeding or using mechanical treatment to improve site health is limited due to steep slopes.

12a. Calculating Safe Stocking Rates: Proper stocking rates should be incorporated into a grazing management strategy that protects the resource, maintains or improves rangeland health, and is consistent with management objectives. Safe stocking rates will be based on useable forage production, and should consider ecological condition and trend of the site, and past grazing use history.

Calculations used to determine a safe stocking rate are based on the amount of useable forage available, taking into account the harvest efficiency of the animal and the grazing strategy to be implemented. Average annual production must be measured or estimated to properly assess useable forage production and stocking rates.

12b. Guide to Safe Stocking Rates: The following charts provide a guide for determining a 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, hence this table should not be used without on-site information as to current 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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12c. 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/PPC) <i>Western wheatgrass, bluebunch wheatgrass, green needlegrass, little bluestem, winterfat</i> (S.I. >75%) | 13–14" | 1250-1400 | 1050-1200+ | .33-.38+ | 2.6-3.0 | 1100-1250+ | .35-.40+ | 2.5-2.9 |
| | 10–12" | 800-1100 | 650-950 | .20-.30+ | 3.3-5.0 | 700-1000+ | .22-.32+ | 3.7-4.5 |
| 2. Medium and Short Grasses, Shrubs <i>Western wheatgrass, Sandberg bluegrass, blue grama, Wyoming big sagebrush</i> (S.I. 55–75%) | 13–14" | 1050-1200 | 800-1000 | .25-.32 | 3.1-4.0 | 850-1050 | .27-.33 | 3.0-3.7 |
| | 10–12" | 700-950 | 500-800 | .16-.25 | 4.0-6.5 | 550-850 | .17-.27 | 3.7-5.9 |
| 3. Short Grasses, Shrubs, Annuals, Cacti <i>Blue grama, threadleaf sedge, prairie junegrass, Wyoming big sagebrush, plains pricklypear</i> (S.I. 30–50%) | 10–14" | 600-1000 | 350-750 | .11-.24 | 4.2-9.1 | 400-800 | .13-.15 | 4.0-7.7 |
| 4. Medium and Short Grasses, Annual grasses and Forbs <i>Western wheatgrass, blue grama, cheatgrass</i> (S.I. <30%) | 10–14" | 400-700 | 150-400 | .03-.09 | 11.0-33+ | 200-500 | .04-.11 | 9.1-25+ |

Stocking rates are calculated from average forage production values using a 25% Harvest Efficiency factor for preferred & desirable plants, and 10% Harvest Efficiency for less desirable species. AUM calculations are based on 790 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.

Ecological Site Description—Rangeland

Clayey–Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East

MLRA: 60B – Pierre Shale Plains, East

R058AE005MT, R060BE583MT

12d. Plant Forage Preferences for Cattle and Sheep

Legend: P=Preferred D=Desirable U=Undesirable E=Emergency
 N=Nonconsumed T=Toxic Blank=Unknown or no data
 Winter (W) = Jan., Feb., March; Spring (SP) = April, May, June;
 Summer (SU) = July, Aug., Sept.; Fall (F) = Oct., Nov., Dec.

| PLANT NAME | Cattle | | | | Sheep | | | |
|----------------------------------|--------|-----|-----|-----|-------|------|-----|-----|
| | W | SP | SU | F | W | SP | SU | F |
| Green needlegrass | P | P | P | P | P | P | P | P |
| Western wheatgrass | P | D | D | P | D | D | D | D |
| Thickspike wheatgrass | P | P | P | P | P | P | P | P |
| Little bluestem | P | P | P | P | U | D | D | U |
| Bluebunch wheatgrass | P | D | P | P | D | D | D | D |
| Sideoats grama | P | P | P | P | D | D | P | D |
| Needleandthread ^{1/} | D | D | D | D,T | D | D | D | D |
| Sandberg bluegrass | D | D | D | D | D | D | D | D |
| Threadleaf and Needleleaf sedge | D | P | P | D | D | P | P | D |
| Montana wheatgrass | P | P | P | P | P | P | P | P |
| Prairie junegrass | D | D | D | D | D | P | D | D |
| Plains muhly | D | D | D | D | D | D | D | D |
| Alkali sacaton | D | D | U | D | D | D | U | D |
| Blue grama | D | D | D | D | D | P | P | D |
| Plains reedgrass | D | D | D | D | U | U | U | U |
| Buffalograss | D | D | D | D | D | D | D | D |
| Red threeawn | N | U | N | N | N | U | N | N |
| Tumblegrass | N | U | N | N | N | U | N | N |
| Cheatgrass ^{2/} | U | D | N | N | U | P | U | U |
| Black samson | N | D | D | D | D | P | P | D |
| Prairieclover spp. | N | D | D | D | D | D | D | D |
| Dotted gayfeather | N | P | P | P | D | P | D | D |
| Milkvetch spp. ^{3/} | N | D,T | D,T | D,T | D,T | P,T | D,T | D,T |
| American vetch | N | P | P | D | N | P | P | D |
| Prairie coneflower | N | D | D | D | D | D | D | D |
| Wild onion | N | P | P | N | N | P | P | N |
| Hood's phlox | N | N | N | N | U | U | U | U |
| Pussytoes spp. | N | N | N | N | U | U | U | U |
| Wild parsley | N | D | D | U | N | D | D | U |
| Green sagewort | N | N | N | N | N | N | N | N |
| Scarlet globemallow | N | D | D | D | N | D | D | D |
| Two-grooved poisonvetch | N | T | T | T | N | T | T | T |
| White point loco | N | T | T | T | T,N | T,N | T,N | T,N |
| Low larkspur | N | N,T | N,T | N | N | D,T | D,T | N |
| Death camas | N | T | T | N | N | T | T | N |
| Winterfat | P | P | P | P | P | D | D | P |
| Nuttall's saltbush | P | P | P | P | P | P | P | P |
| Prairie rose | N | N | N | N | D | D | D | D |
| Silver sagebrush | D | D | D | D | D | D | D | D |
| Green and Rubber rabbitbrush | U | U | U | U | U | U | U | U |
| Wyoming big sagebrush | N | N | N | N | P | D | D | P |
| Rocky Mtn. Juniper | N | N | N | N | U | N | N | N |
| Greasewood ^{4/} | N | N | N,E | N,E | D | U, T | U | D |
| Fringed sagewort | N | N | N | N | U | U | U | U |
| Yucca | N | N | N | N | | D | D | |
| Broom snakeweed ^{5/} | N | N | N | U | U | U | U | U |
| Plains pricklypear ^{6/} | N | N | N | N | U | U | U | U |

^{1/} The awns and sharp seeds of needleandthread can harm livestock when dry.

^{2/} Not a native plant, but a common invader.

^{3/} Some species of milkvetch are poisonous.

^{4/} Can be toxic to sheep in spring if large quantities are ingested.

^{5/} Broom snakeweed can be poisonous, but this is not usually a problem in Montana because plants die back in winter and do not have green leaves in early spring.

^{6/} The spines can be injurious to livestock.

Ecological Site Description—Rangeland

Clayey–Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
MLRA: 60B – Pierre Shale Plains, East
R058AE005MT, R060BE583MT

13. Wildlife Interpretations: The Clayey–Steep ecological site provides generally good habitat for deer because of the sloping topography and the diversity of forb and shrub production. It is generally fair habitat for antelope, for the same landscape factors. It provides diverse habitat for many other prairie wildlife species. Some species of special emphasis, such as the mountain plover and swift fox, will use the habitat provided by this site for portions of their life cycle. The following is a description of habitat values for the different plant communities that may occupy the site:

Plant Community 1: Tall Grasses/ Forbs/ Shrubs (HCPC or PPC): The high proportion of grasses plus a diversity of forbs, shrubs and half-shrubs in this community favors grazers and mixed feeders such as bison, pronghorn and elk. Also, the combination of steep topography and complexity of aspect results in higher shrub density and diversity compared to a Clayey Ecological Site. This provides winter feeding habitat (shrubs) on warm exposures and thermal and escape cover (topography) for mule deer.

Large animal nutrition levels are relatively high year-long with the diversity of warm and cool season grasses, forbs and shrubs. Complex plant structural diversity and litter cover provide habitat for a wide array of small mammals (both seed-eaters, i.e. deer mice and herbivores, i.e. voles) and neo-tropical migratory birds. Diverse prey populations are available for raptors like ferruginous hawks and golden eagles. The diversity of grass and forb life forms and heights, along with scattered shrubs and junipers, provides habitat for many bird species including the spotted towhee, field sparrow, western meadowlark, chipping sparrow and loggerhead shrike.

Plant Community 2: Medium and Short Grasses/ Medium Shrubs: A reduction in warm season grass cover shortens the green feed period for grazers. Selective and mixed feeders may benefit from an increase in forbs. Winter range nutrition levels decline for big game species as winterfat and Nuttall's saltbush decrease. Sage grouse, Brewer's sparrows and sage thrashers may make use of the increased sagebrush cover. General habitat structural diversity decreases with the loss of the taller warm and cool season bunch grasses.

Plant Community 3: Short Grasses/ Wyoming Big Sagebrush/ Annuals & Biennials/ Cacti: Wildlife habitat value is quite low as the plant community is simplified. Winter range nutrition levels for game animals decline following loss of the tall, palatable grasses and shrubs. Loss of residual plant cover and litter degrades nest cover for many bird species. Small mammal species composition shifts to seed-eaters, like deer mice, with loss of ground cover and an increase in annual plants.

Plant Community 4: Annual Grasses/ Medium and Short Perennial Grasses: Removal of shrubs by wildfire decreases winter habitat value for big game animals as well as general wildlife habitat structural diversity. The period of high nutrition levels for grazers and mixed feeders is shortened considerably with the loss of shrubs and a decrease in grass and forb diversity. Small mammal populations are dominated by deer mice as annual plants increase. The value of breeding bird habitat declines with loss of residual plant material and litter. Fire, followed by good management, may result in excellent wildlife value over time as the plant community recovers.

Ecological Site Description—Rangeland

Clayey–Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
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R058AE005MT, R060BE583MT

13a. Plant Preferences for Antelope and Deer:

Legend: P=Preferred D=Desirable U=Undesirable E=Emergency
N=Nonconsumed T=Toxic Blank=Unknown or no data

Winter (W) = Jan., Feb., March; Spring (SP) = April, May, June;
Summer (SU) = July, Aug., Sept.; Fall (F) = Oct., Nov., Dec.

| PLANT NAME | Antelope | | | | Deer | | | |
|------------------------|----------|------|------|------|------|------|------|------|
| | W | SP | SU | F | W | SP | SU | F |
| Perennial grasses | P | P | P | P | D | P,D | D | D |
| Red threeawn | N | N | N | N | N | N | N | N |
| Annual grasses | N | P,D | N | D | N | P,D | N | D |
| Sedges | D | P | P | P | D | P | P | P |
| Black samson | P | P | P | P | D | D | D | D |
| Prairieclover spp. | P | P | P | P | P | P | P | P |
| Dotted gayfeather | D | P | D | D | D | P | P | P |
| Milkvetch spp. | D | P | P | D | D | D | D | D |
| Scurfpea spp. | N | D | D | D | D | D | D | D |
| Hairy goldenaster | E | E | E | E | E | E | E | E |
| Goldenrod spp. | D | P | P | P | D | D | D | D |
| American licorice | P | P | D | D | D | P | D | D |
| Prairie coneflower | D | P | P | D | D | P | D | D |
| American vetch | P | P | P | P | D | P | P | P |
| Hood's phlox | U | U | U | U | U | U | U | U |
| Wild parsley | U | D | U | U | U | D | U | U |
| Green sagewort | N | N | N | N | N | N | N | N |
| Scarlet globemallow | D | D | D | D | D | D | D | D |
| Twogrooved poisonvetch | N, T | N, T | N, T | N, T | N, T | N, T | N, T | N, T |
| White point loco | N, T | N, T | N, T | N, T | N, T | N, T | N, T | N, T |
| Death camas | N, T | N, T | N, T | N, T | N, T | N, T | N, T | N, T |
| Larkspur spp. | N, T | N, T | N, T | N, T | N, T | N, T | N, T | N, T |
| Winterfat | P | P | P | P | P | P | P | P |
| Nuttall's saltbush | P | P | P | P | D | P | P | D |
| Prairie rose | U | U | U | U | E | D | E | E |
| Silver sagebrush | D | D | P | D | P | P | D | P |
| Wyoming big sagebrush | P | P | P | P | P | P | D | D |
| Rabbitbrush spp. | D | D | D | D | D | D | D | D |
| Rocky Mtn. Juniper | N | N | N | N | D | D | D | D |
| Greasewood | P | P | D | D | P | P | D | D |
| Fringed sagewort | D | U | U | D | D | U | U | D |
| Green sagewort | N | N | N | N | N | N | N | N |
| Plains pricklypear | N | N | N | N | N | N | N | N |
| Broom snakeweed | N | N | D | N | D | D | P | P |

14. Hydrology Data: 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.

Good hydrologic conditions exist on rangelands if plant cover (grass, litter, and brush canopy) is greater than 70%. Fair conditions exist when cover is between 30 and 70%, and poor conditions exist when cover is less than 30%. Sites in high similarity to HCPC (Plant Communities 1 and 2) generally have enough plant cover and litter to optimize infiltration, minimize runoff and erosion, and have a good hydrologic condition. The deep root systems of the potential vegetation help maintain or increase infiltration rates and reduce runoff.

Ecological Site Description—Rangeland

Clayey–Steep, 10–14" MAP

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Sites in low similarity (Plant Communities 3 and 4) are generally considered to be in poor hydrologic condition as the majority of plant cover is from shallow-rooted species such as blue grama and annual grasses.

Erosion is minor for sites in high similarity. Rills and gullies should not be present. Water flow patterns, if present, will be barely observable. Plant pedestals are essentially non-existent. Plant litter remains in place and is not moved by erosion. Soil surfaces should not be compacted or crusted. Plant cover and litter helps retain soil moisture for use by the plants. Maintaining a healthy stand of perennial vegetation will optimize the amount of precipitation that is received. (Reference: Engineering Field Manual, Chapter 2 and Montana Supplement 4).

15. Recreation and Natural Beauty: This site provides recreational opportunities for big game and upland bird hunting, and hiking. The forbs have flowers that appeal to photographers. This site provides valuable open space and visual aesthetics.

16. Wood Products: None

17. Site Documentation:

Authors: Original: REL, AJN, 1983 Revised: JVF, REL, RSN, MJR, SKW, SVF, 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: 16
NRCS–Range Condition Record (ECS-2): 30
NRCS–Range/Soil Correlation Observations & Soil 232 notes: 5

Field Offices where this site occurs within the state:

| | | | |
|----------|----------|------------|--------|
| Baker | Ekalaka | Hysham | Sidney |
| Billings | Forsyth | Jordan | Terry |
| Broadus | Glendive | Miles City | Wibaux |
| Circle | Hardin | Roundup | |

Site Approval:

This site has been reviewed and approved for use:

Rhonda Sue Noggles
State Rangeland Management Specialist

06/30/03
Date

Ecological Site Description—Rangeland

Clayey-Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
MLRA: 60B – Pierre Shale Plains, East
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Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 1
HCPC /PPC



Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 1
HCPC /PPC
Dawson County



Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 1
HCPC /PPC
Carter County

Ecological Site Description—Rangeland

Clayey-Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
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**Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 2
Prairie County**



**Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 2
Fallon County**

Ecological Site Description—Rangeland

Clayey-Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
MLRA: 60B – Pierre Shale Plains, East
R058AE005MT, R060BE583MT



**Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 2
Fallon County**



**Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 3
Custer County**



**Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 3
Custer County**

Ecological Site Description—Rangeland

Clayey-Steep, 10–14" MAP

MLRA: 58A – Sedimentary Plains, East
MLRA: 60B – Pierre Shale Plains, East
R058AE005MT, R060BE583MT



Clayey-Steep 10–14"
Sedimentary Plains, east
Plant Community 3
Prairie County