

Ecological site EX043B23A110

Dense Clay (DC)

Absaroka

Lower Foothills

Last updated: 3/05/2025

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 043B–Central Rocky Mountains

43B – Central Rocky Mountains – The Central Rocky Mountains extends from northern Montana to southern extent of Wyoming and from Idaho to central Wyoming. The southern extent of 43B is comprised of a combination of metamorphic, igneous, and sedimentary mountains and foothills. Climatic changes across this extent are broad and create several unique breaks in the landscape. Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

LRU notes

Land Resource Unit (LRU) 43B23A: Absaroka Lower Foothills Based on the shifts in geology, precipitation patterns and other climatic factors, as well as elevations and vegetation, the Absaroka Range was divided into LRU 23. Further division of this LRU is necessary due to the gradient moving from the foothills to the summit, as well as aspect shifts (north/east face versus south/west face). Subset A is set for the lower elevations within the foothills with 10 to 14 inches of precipitation. To verify or identify the LRU A (the referenced LRU for this ecological site), refer to the Wyoming LRU matrix key contained within the Ecological Site Key. This particular LRU occurs along the eastern lower foothills of the Absaroka Range. This LRU starts north of Clark, WY and runs to the Thermopolis, WY area. Once the foothills cross into the Northern Beartooth Range, the climatic patterns and elevational changes shifts the plant community and allows for a break in LRU's near the Montana state line. As the LRU follows to the south and tracks east with the intersection of the Absaroka and Owl Creek Ranges, the face changes aspect and geology creating a shift in plant dynamics and a break in the LRU. The extent of soils currently correlated to this ecological site does not fit within the digitized boundary. Many of the noted soils are provisional and will be reviewed and corrected in mapping update projects. Other map units are correlated as small inclusions within other MLRA's/LRU's based on elevation, landform, and biological references. Moisture Regime: Aridic Ustic or Ustic Aridic – Progressive Initial mapping has shown that soil correlations completed prior to 2014 were identified as ustic aridic, after further evaluation of climatic and soil taxonomy information the proper moisture regime is aridic ustic. Both are recorded here until an update project is completed to correct the previous correlations. Temperature Regime: Frigid Dominant Cover: Rangeland – Sagebrush Steppe (major species is Wyoming Big Sagebrush) Representative Value (RV) Effective Precipitation: 10-14 inches (254 – 355 mm) RV Frost-Free Days: 80-110 days

Classification relationships

Relationship to Other Established Classification Systems: National Vegetation Classification System (NVC): 3 Xeromorphic Woodland, Scrub & Herb Vegetation Class 3.B Cool Semi-Desert Scrub & Grassland Subclass 3.B.1 Cool Semi-Desert Scrub & Grassland formation 3.B.1.NE Western North American Cool Semi-Desert Scrub & Grassland Division M169 Great Basin & Intermountain Tall Sagebrush Shrubland & Steppe Macrogroup G302 Artemisia Tridentata - Artemisia tripartita - Purshia tridentata Big Sagebrush Steppe Group Ecoregions (EPA): Level I: 10 North American Deserts Level II: 10.1 Cold Deserts Level III: 10.1.18 Wyoming Basin Level IV: 10.1.18.b Big Horn Basin and 10.1.18.d Foothills and Low Mountains

Ecological site concept

- Site receives no additional water.
- Slope is 30%
- Soils are:
 - o Moderately deep to very deep (20-80+ in. (50-200+ cm)
 - o Not skeletal (35% rock fragments) within 20" (50 cm) of mineral soil surface
 - o None to Slightly effervescent throughout top 20" (50 cm) of mineral soil surface
 - o Non-saline, sodic, or saline-sodic
 - o Textures range from sandy clay loam to clay in top 4" (10 cm) of mineral soil surface
 - o Clay

content is 35% in top 4" (10 cm) of mineral soil surface o All subsurface horizons in the particle size control section have a weighted average of ? 40% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm's or from 25-100 cm's). The Dense Clay ecological site is based on heavy clay soils that develop large cracks at the surface when dry. Site has a thin cap of coarser soils on the surface. This community is dominated by birdfoot sagebrush and generally lacks Wyoming big sagebrush.

Associated sites

EX043B23A104	Clayey (Cy) Absaroka Lower Foothills Clayey ecological site does not have the abrupt clay increase and cracking to inhibit plant growth. It generally occurs on around isolated patches of Dense Clay communities.
EX043B23A140	Saline Lowland Drained (SLDr) Absaroka Lower Foothills Saline Lowland Drained ecological sites will occur in close proximity and interspersed with Dense Clay along the toe-slopes of benches and on stream terraces.
EX043B23A144	Saline Upland (SU) Absaroka Lower Foothills Saline Upland sites will occur in combination or in mosaic patterns with Dense Clay.

Similar sites

EX043B23A154	Shale (Sh) Absaroka Lower Foothills Similar in appearnce with Shale being shallow to salt bearing soils where Dense Clay is lacking the chemistry.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia pedatifida</i>
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Elymus elymoides</i>

Legacy ID

R043BX510WY

Physiographic features

The Dense Clay ecological site will usually occur in lower landscape position, on flat to moderately sloping land. It is found on all exposures. Slopes are mostly 5 to 30 percent.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Fan apron (2) Foothills > Fan remnant (3) Foothills > Colluvial apron
Runoff class	Medium to very high
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	1,370 – 2,010 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 10 to 14 inches (254 – 355 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50 percent of the mean annual precipitation. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation. Average snowfall is about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. High winds are generally blocked from the basin by high mountains, but can occur in conjunction with an occasional thunderstorm. Growth of native cool-season plants begins about April 15 and continues until about July 1. Cool weather and moisture in September may produce some green up of cool season plants that will continue through late October.

Review of a 30 year trend of data for Average Temperature as well as Average Precipitation, there has been a warming trend, but as the last 12 years graphed, the temperatures have swayed high and low, but overall it has maintained a steady trajectory, neither increasing nor decreasing. Where on the moisture side, the trajectory in trend has been a slow decline. The swings of when spring warm up and first frost hit with the decline in average precipitation have produced a drought effect where the moisture is not being received when the plants and ground is able to utilize the moisture. And in some cases, the late precipitation has encouraged the warm season or mat forming species over the cool season bunchgrasses that are the drivers of the natural system. Early frosts, with dry open winters has created a more arid or desert effect on plants resulting in high rates of winter kill, loss of vigor or overall damage to the plant.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/>. "Buffalo Bill Dam", "Cody 21SW", "Thermopolis", "Thermopolis 9NE", "Thermopolis 25WNW" and "Wapiti 1NE" are the representative weather stations within LRU D. The following graphs and charts are a collective sample representing the averaged normals and 30 year annual rainfall data for the selected weather stations from 1981 to 2010.

Table 3 Representative climatic features

Frost-free period (characteristic range)	60-110 days
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Freeze-free period (characteristic range)	100-140 days
Precipitation total (characteristic range)	280-310 mm
Frost-free period (actual range)	50-120 days
Freeze-free period (actual range)	90-150 days
Precipitation total (actual range)	250-330 mm
Frost-free period (average)	80 days
Freeze-free period (average)	120 days
Precipitation total (average)	310 mm

- (1) BUFFALO BILL DAM [USC00481175], Cody, WY
- (2) WAPITI 1NE [USC00489467], Cody, WY
- (3) CODY 21 SW [USC00481855], Cody, WY
- (4) SUNSHINE 3NE [USC00488758], Meeteetse, WY
- (5) THERMOPOLIS 25WNW [USC00488888], Thermopolis, WY
- (6) THERMOPOLIS [USC00488875], Thermopolis, WY

Influencing water features

The characteristics of these upland soils have no influence from ground water (water table below 60 inches (150 cm)) and have minimal influence from surface water/overland flow. Periods of ponding during storm events may occur, but have little to no effect on the vegetation of the site. Water restriction and movement off site are the key drivers of the vegetation, creating a dry or droughty appearance.

Soil features

The soils of this site are very shallow (less than 10 inches) to very deep, well to poorly drained soils formed in alluvium or alluvium over residuum. Layers of the soil most influential to the plant community varies from 3 to 6 inches thick. These soils have slow to very slow permeability. The topsoil, except for thin ineffectual layers, will be heavy clays and/or soils that develop large cracks when dry and are very sticky when wet. These sites typically have moderate saline and /or alkaline soils, but high amounts of soluble salt can occur. The soil characteristics having the most influence on plants are the very slow infiltration rate, which reduces the available moisture, and the amount of soluble salts.

Table 4. Representative soil features

Parent material	(1) Slope alluvium – sedimentary rock (2) Residuum – sedimentary rock
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Surface texture	(1) Clay (2) Silty clay (3) Sandy clay loam (4) Clay loam
Drainage class	Poorly drained to well drained
Permeability class	Very slow to slow
Soil depth	0 – 150 cm
Available water capacity (0-101.6cm)	1.42 – 20 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 30
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 10

Ecological dynamics

These plant communities narratives do not represent every possibility, but they capture the most prevalent and repeatable plant communities. As data is collected, plant communities may be revised, removed, or new communities may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Potential vegetation on the Dense Clay ecological site is dominated by drought resistant, mid-stature cool-season perennial grasses and shrubs. The expected potential composition for this site is 50% grasses, 10% forbs and 40% woody plants. The composition and production will vary naturally due to historical use and fluctuating precipitation.

As this site deteriorates, species such as Sandberg bluegrass and birdfoot sagebrush will increase. Plains pricklypear and weedy annuals will invade. Cool season grasses such as rhizomatous wheatgrass, bottlebrush squirreltail, and Indian ricegrass will decrease in frequency and production.

The reference Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Mid-Stature, Cool-Season Bunchgrass			11-112	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0-56	0-10
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	11-56	2-10
2	Rhizomatous, Cool-Season Grasses			11-112	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	11-112	5-25
	Montana wheatgrass	ELAL7	<i>Elymus albicans</i>	0-28	0-5
3	Short-Stature, Cool-Season Grasses			11-56	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	11-56	0-10
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-34	0-10
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-34	0-5
	muttongrass	POFE	<i>Poa fendleriana</i>	0-34	0-5
4	Perennial Grasses			0-28	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-28	0-5
Forb					
5	Perennial Forbs			6-56	
	woodyaster	XYLOR	<i>Xylorhiza</i>	0-22	0-5
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-22	0-5
	milkvetch	ASTRA	<i>Astragalus</i>	0-11	0-5
	leafy wildparsley	MUDI	<i>Musineon divaricatum</i>	0-11	0-5
Shrub/Vine					
6	Dominant Shrub			56-112	
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	56-112	10-40
7	Miscellaneous Shrubs			0-56	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-22	0-5
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-11	0-5

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

Animal Community – Wildlife Interpretations Reference: Rhizomatous Wheatgrasses/Birdfoot sagebrush: The composition of grasses and shrubs in this plant community favors feeders, such as antelope. Because of the low growing shrub component this is not suitable for thermal and escape cover for deer, but may be preferred by antelope or other wildlife. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Prairie dogs and other small mammals prefer these areas as tall, dense stands of vegetation impede recognition and escape from predators. Mixed Perennial Grass/Birdfoot Sagebrush: This plant community exhibits a low level of plant species diversity but is an important winter range for antelope. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Prairie dogs and other small mammals prefer these areas as tall, dense stands of vegetation impede recognition and escape from predators. Birdfoot Sagebrush/Bare Ground: This plant community has a low level of diversity. Due to the dominance of annual weeds and grasses, feed for large mammals is limited. Areas of bare ground may provide leks for birds such as sage grouse or habitat for Prairie dogs and other small mammals. Animal Community – Grazing Interpretations The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor. Plant Community Production Carrying Capacity* (lb./ac) (AUM/ac) (Ac/AUM) Reference Plant Community 150-450 .08 12.17 Mixed Perennial Grass/Birdfoot Sagebrush 75-300 .06 18.25 Birdfoot Sagebrush/Bare Ground 50-200 .03 29.2 * - Continuous, season-long grazing by cattle under average growing conditions. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements. Distance to water, shrub density, and slope can affect grazing capacity within a management unit. Adjustments should be made for the area that is considered necessary for reduction of animal numbers. For example, 30% of a management unit may have 25% slopes and distances of greater than 1 mile from water; therefore the adjustment is only calculated for 30% of the unit (i.e. 50% reduction on 30% of the management unit). Fencing, slope length, management, access, terrain, kind and class of livestock, and breeds are all factors that can increase or decrease the percent of graze-able acres within a management unit. Adjustments should be made that incorporate these factors when calculating stocking rates.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group C and D. Infiltration ranges from slow to very slow. Runoff potential for this site varies from high to very high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information). Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an aesthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented in the original site description was derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing the original site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, USDI and USDA Interpreting Indicators of Rangeland Health Version 3, and USDA NRCS Soil Surveys from various counties. Information presented here has been derived from NRCS inventory data, Field observations from range trained personnel, and the existing range site descriptions. Those involved in developing the Loamy range site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Those involved in the development of the concept for the Ecological site include: Ray Gullion, Retired Area Range Management Specialist, NRCS; Jim Wolf, Resource Manager, USDI-BLM; Jack Mononi, Range Management Specialist, USDI-BLM; Daniel Wood, MLRA Soil Survey Leader, NRCS; Jane Karinen, Soil Data Quality Specialist, NRCS; and Marji Patz, Ecological Site Specialist, NRCS. Inventory Data References: Ocular field estimations observed by trained personnel were completed at each site. Then sites were selected where a 100 foot tape was stretched and the following sample procedures were completed by inventory staff. For full sampling protocol and guidelines with forms please refer to the Wyoming ESI Operating Procedures, compiled in 2012 for the Powell and Rock Springs Soil Survey Office, USDA-NRCS. • Double Sampling Production Data (9.6 hoop used to estimate 10 points, clipped a minimum of 3 of these estimated points, with two 21 foot X 21 foot square extended shrub plots). • Line Point Intercept (over story and understory captured with soil cover). Height of herbaceous and woody cover is collected every three feet along established transect.) • Continuous Line Intercept (Woody Canopy Cover, with minimum gap of 0.2 of a foot for all woody species and succulents. Intercept height collected at each measurement.), • Gap Intercept (Basal Gap measured with a minimum gap requirement of 0.7 foot.), • Sample Point (10 – 1 meter square point photographs taken at set distances on transect. Red using the sample point computer program established by the High Plains Agricultural Research Center, WY). • Soil Stability (Slake Test – surface and subsurface samples collected and processed according to the soil stability guidelines provided by the Jornada Research Center, NM.)

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Approval

Kirt Walstad, 3/05/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Blaise Allen
Contact for lead author	blaise.allen@usda.gov
Date	02/18/2020
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** Due to the wide slope range associated with this site, the number and extent of rills will vary from none on slope < 9% to common on slopes > 25%. If present, will be at the upper end of the slope range for this site (>15%) and will be short (<3 ft) and widely spaced relative to slope distance (8-10 feet). Minor rill development may be observed following major thunderstorm or spring runoff events, but they should heal during the next growing season.
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2. **Presence of water flow patterns:** Due to the wide slope range associated with this site, water flow patterns vary from barely observable on slopes of < 9% and from broken and irregular in appearance to continuous on slopes > 25%

3. **Number and height of erosional pedestals or terracettes:** Not evident on slopes < 9%. Erosional pedestals will be present with terracettes present at debris dams on slopes >9%. Perennial vegetation shows little evidence of erosional pedestalling (2 to 3% of individual plants). Plant roots are covered and litter remains in place around plant crowns. Terracettes should be absent or, if present, stable.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 30-60%, occurring in small openings (2-3 ft) throughout the site. Animal activity (i.e. burrows) may occasionally result in isolated bare patches up to 5' in diameter.

5. **Number of gullies and erosion associated with gullies:** Active gullies restricted to concentrated water flow patterns. A few gullies may be present in landscape settings where they transport runoff from areas of greater water flow such as exposed bedrock. These gullies will be limited to slopes exceeding 20% slope and adjacent to sites where this runoff accumulation occurs. Any gullies present should show little sign of accelerated erosion and should be stabilized with perennial vegetation.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None. No evidence of wind generated soil movement is expected.

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement occurs on slopes < 9%. Fine litter in the interspaces may move up to 3 ft following a significant run-off event. Coarse litter generally does not move.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 30% or greater of soil surface and maintains soil surface integrity. Soil Stability Index ratings range from 3 (interspaces) to 6 (under plant canopy), but average values should be 4 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon. Soil Organic Matter of less than 1% is expected. Field indicators of departure from the reference condition include exposure of subsoil as evidenced by excessive pedestalling and/or surface disturbance.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Relative composition for this site is 50% grasses, 10% forbs and 40% woody plants. Sparse plant canopy, slow infiltration rates, and the high amount of bare ground contribute to very slow to slow infiltration rates, the amount of bare ground and steepness of slopes results in a naturally high runoff rate on slopes > 25%, even in HCPC.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer should be present, but soil crusting in dry conditions is typical.

12. **Functional/Structural Groups** (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant: Shrubs (1 Species)

Sub-dominant: Short Stature, Cool Season Grasses (1 Species) Mid Stature, Cool Season Grasses (1 Species) Rhizomatous Cool Season Grasses (1 species)

Other: Forbs

Additional: 12a. Community 1.1 Perennial Shrubs > Mid Stature Grasses > Rhizomatous Cool Season Grasses = Short Stature Grasses 12b. Functional/Structural groups not expected- annual grasses 12c. Number of Functional/Structural groups: 4 Groups 12d. Species number in Dominate and sub-dominate F/S groups: 4 species

13. **Amount of plant mortality and decadence** (include which functional groups are expected to show mortality or decadence):
Some plant mortality and decadence is expected, typically associated with shrub component.
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14. **Average percent litter cover (%) and depth (in):** Litter ranges from 5-25% of total canopy measurement with total litter (including beneath the plant canopy) from 10-40% expected. Herbaceous litter depth is typically very shallow, ranging from 1-5mm. Woody litter can be up to a couple inches (4-6 cm).
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15. **Expected annual annual-production** (this is TOTAL above-ground annual-production, not just forage annual-production):
English: 150-450 lb/ac (300 lb/ac average); Metric: 68-204 kg (136 kg average).
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16. **Potential invasive (including noxious) species (native and non-native).** List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Bare ground greater than 70% is the most common indicator of a threshold being crossed. Birdfoot sagebrush, Sandberg bluegrass, Woody aster, Annuals, Exotics, and Species found on Noxious Weed List
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17. **Perennial plant reproductive capability:** May be Limited due to effective moisture and seed to soil contact. Western Wheatgrass will commonly reproduce by underground rhizomes and not by seed production, especially in drought years.
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