

Ecological site R034AY308WY

Coarse Upland High Plains Southeast (CU)

Accessed: 05/19/2024

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.



Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site will usually occur in an upland position on gentle slopes but may occur on all slopes and positions.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,286 m
Slope	0–70%

Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 10-14 inches per year. 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. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool season plants begins about April 15 and continues to about June 15. Some green up of cool season plants usually occurs in September.

The following information is from the "Laramie" climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 57 149 June 1 – September 16

Freeze-free period (days): 94 183 May 15 – September 28

Annual Precipitation (inches): 5.8 17.34

Mean annual precipitation: 11.53 inches

Mean annual air temperature: 42.2 F (30.4 F Avg. Min. to 53.9 F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include "Dixon " and "Medicine Bow".

Table 3. Representative climatic features

Frost-free period (average)	149 days
Freeze-free period (average)	183 days
Precipitation total (average)	356 mm

Influencing water features

Stream type: None

Soil features

The soils of this site are deep, well-drained and generally non-calcareous. Surface soils are usually loams or sandy loams. Soils contain at least 35 percent by volume coarse fragments in the first 20 inches. The volume of coarse fragments generally increases with depth. These stony, and/or bouldery soils occur as terraces, fan terraces, or glacial moraines.

Table 4. Representative soil features

Surface texture	(1) Stony loam (2) Cobbly sandy loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow to moderate

Soil depth	51–152 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	20–30%
Available water capacity (0-101.6cm)	6.35–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

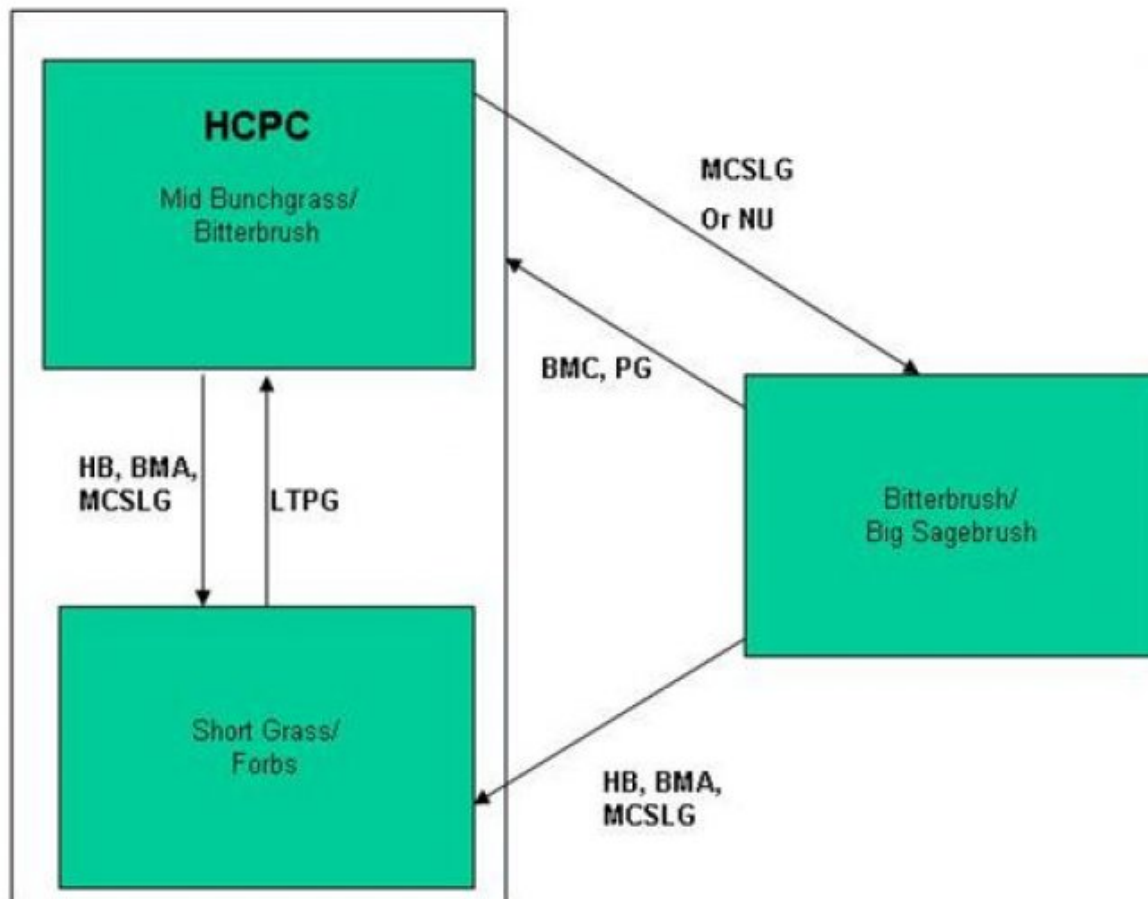
As this site deteriorates because of a combination of frequent and severe grazing, species such as big sagebrush and Douglas rabbitbrush will increase. Cool-season grasses such as bluebunch wheatgrass, little bluestem, and woody plants such as bitterbrush will decrease in frequency and production.

Big sagebrush will become dominant on some areas with an absence of fire. Wildfires are often actively controlled so chemical control using herbicides has replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

The Historic Climax 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



BMA – Brush Management (all methods)
BMC – Brush Management (chemical)
BMF – Brush Management (fire)
BMM – Brush Management (mechanical)
CSP – Chemical Seedbed Preparation
CSLG – Continuous Season-long Grazing
DR – Drainage
CSG – Continuous Spring Grazing
HB – Heavy Browse
HCSLG – Heavy Continuous Season-long Grazing
HI – Heavy Inundation
LPG – Long-term Prescribed Grazing
MT – Mechanical Treatment (chiseling, ripping, pitting)
MCSLG – Moderate Continuous Season Long Grazing

NF – No Fire
NS – Natural Succession
NWC – Noxious Weed Control
NWI – Noxious Weed Invasion
NU – Nonuse
P&C – Plow & Crop (including hay)
PG – Prescribed Grazing
RPT – Re-plant Trees
RS – Re-seed
SGD – Severe Ground Disturbance
SHC – Severe Hoof Compaction
WD – Wildlife Damage (Beaver)
WF – Wildfire

State 1
Mid Bunchgrass/Bitterbrush Plant Community (HCPC)

Community 1.1
Mid Bunchgrass/Bitterbrush Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. Potential vegetation is estimated at 60% grasses or grass-like plants, 15% forbs, and 25% woody plants. The major grasses include bluebunch wheatgrass, little bluestem, muttongrass, and western wheatgrass. Other grasses may include Indian ricegrass, prairie junegrass, Sandberg bluegrass, threadleaf sedge and green needlegrass. Bitterbrush and black sagebrush are the dominant woody plants. Other woody species may include big sagebrush, green rabbitbrush, and serviceberry. A typical plant composition for this state consists of bluebunch wheatgrass 10-20%, little bluestem 10-20%, muttongrass 5-10%, and western wheatgrass 5-10%. Other grasses 10-20%, perennial forbs 10-15%, bitterbrush 5-10%, black sagebrush 5-10%, and 5-10% other woody species. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope. Ground cover, by ocular estimate, varies from 25-35%. The total annual production (air-dry weight) of this state is about 1000 lbs./acre, but it can range from about 600 lbs./acre in unfavorable years to about 1400 lbs./acre in above average years. This plant community is extremely stable and well adapted to the Cool Central Desertic Basins and Plateaus climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Moderate Continuous Season Long Grazing will convert this plant community to the Bitterbrush/Big Sagebrush Plant Community • Heavy browse, Brush Management, and Moderate Continuous Season-long Grazing will convert this plant community to the Shortgrass/Forbs Plant Community.

Figure 4. Plant community growth curve (percent production by month).
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 2
Bitterbrush/Big Sagebrush Plant Community

Community 2.1
Bitterbrush/Big Sagebrush Plant Community

This plant community is a result of moderate continuous season long grazing. Nonuse and lack of fire may contribute to the development of this community. Woody plants such as big sagebrush and bitterbrush are dominant, making up 20 to 50% of the annual production. Woody plants may become decadent and of lower nutritive value for wildlife and livestock. Major grasses in the understory include bluebunch wheatgrass, little bluestem, and western wheatgrass. The total annual production (air-dry weight) of this state is about 800 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1000 lbs./acre in above average years. The state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact, however forage value will decrease and wildlife values will shift toward different species. The watershed is functioning. Transitions or pathways leading to other plant communities are as follows: • Chemical Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will result in a plant community very similar to the Historic Climax Plant Community (Mid Bunchgrass/Bitterbrush). Care should be taken when planning brush management to consider wildlife and critical winter ranges. • Heavy Browse, Brush Management with Moderate Continuous Season Long Grazing will convert this plant community to the Short Grass/Forb Plant Community.

Figure 5. Plant community growth curve (percent production by month).
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 3
Short Grass/Forbs Plant Community

Community 3.1
Short Grass/Forbs Plant Community

This plant community is the result of heavy browse in combination with brush management and moderate continuous season-long grazing. The majority of the woody species have been removed from the community. Western wheatgrass, blue grama, prairie junegrass, muttongrass, threadleaf sedge, and Sandberg bluegrass dominate the site along with forbs such as fringed sagewort, yarrow and phlox. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 300 lbs./acre in unfavorable years to about 800 lbs./acre in above average years. Soil erosion is accelerated because of increased bare ground. The biotic community has been compromised, but is relatively stable. The watershed is functioning, but is at risk of further degradation. Water flow patterns and pedestals are obvious. Infiltration is reduced and runoff is increased. Transitions or pathways leading to other plant communities are as follows: • Long Term Prescribed Grazing with extended periods of rest will result in a plant community very similar to the Historic Climax Plant Community (Mid Bunchgrass/Bitterbrush).

Figure 6. Plant community growth curve (percent production by month).
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				112–224	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	112–224	–
2				112–224	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	112–224	–
3				56–112	
	muttongrass	POFE	<i>Poa fendleriana</i>	56–112	–
4				56–112	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	56–112	–
5				112–280	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–56	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–56	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–56	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–56	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–56	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0–56	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0–56	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–56	–
Forb					
6				112–224	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–56	–
	yarrow	ACHIL	<i>Achillea</i>	0–56	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–56	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–56	–
	larkspur	DELPH	<i>Delphinium</i>	0–56	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–56	–
Shrub/Vine					
7				56–112	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	56–112	–
8				56–112	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	56–112	–
9				56–168	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–56	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	0–56	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–56	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–56	–

Animal community

Animal Community – Wildlife Interpretations

Mid Bunchgrass/Bitterbrush Plant Community (HCPC): This plant community provides suitable thermal and escape cover for mule deer, elk, and antelope. Bitterbrush and sagebrush provide important winter forage for mule deer, antelope, and elk. Year-round habitat is provided for sage grouse and many other sagebrush obligate species such as the sage sparrow, Brewer's sparrow, sage thrasher, pygmy rabbit, sagebrush vole, horned lizard, and pronghorn

antelope. Other birds that would frequent this plant community include horned larks and golden eagles.

Bitterbrush/Big Sagebrush Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals.

Shortgrass/Forb Plant Community: This plant community provides limited forage and cover for elk and mule deer due to lack of woody species. The site may be used as a foraging site by sage grouse if proximal to woody cover.

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)

Mid Bunchgrass/Bitterbrush(HCPC) 600-1400 0.3

Bitterbrush/Big Sagebrush 500-1000 0.26

Short Grass/Forbs 300-800 0.2

* - 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.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A and B. Infiltration ranges from rapid to moderate. Runoff potential for this site varies from low to moderate 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. 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 and shrubs. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogammic 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 esthetic values that appeal to visitors. The varied topography and large boulders appeal to hikers and mountain bikers.

Wood products

No appreciable wood products are present on the site.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations

from range trained personnel were also used. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Inventory Data References

Data Source Number of Records Sample Period State County
SCS-RANGE-417 69 1967-1988 WY Carbon
& others

Contributors

B. Brazee

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)	
Contact for lead author	
Date	05/01/2005
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present

2. **Presence of water flow patterns:** Barely observable

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 30-40% occurring in small areas throughout site

5. **Number of gullies and erosion associated with gullies:** Active gullies should be restricted to areas of concentrated water flow patterns on steeper slopes

6. **Extent of wind scoured, blowouts and/or depositional areas:** Small scoured sites may be observed

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is little to none based on topography and water flow patterns
-
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 50% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to 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
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Infiltration is moderate.
-
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 or soil surface crusting should be present.
-
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:
- Sub-dominant:
- Other:
- Additional: Mid stature Cool Season Grasses > Shrubs > Forbs = Short stature grasses/grasslikes
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low
-
14. **Average percent litter cover (%) and depth (in):** Average litter cover is 15-25% with depths of 0.25 to 0.5 inches
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1000 lbs/ac
-
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: Threadleaf sedge, Sagebrush species, Annuals, and Species found on Noxious Weed List

17. **Perennial plant reproductive capability:** All species are capable of reproducing
-