

Ecological site R034AY354WY

Shale High Plains Southeast (Sh)

Last updated: 5/01/2024

Accessed: 05/10/2025

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.

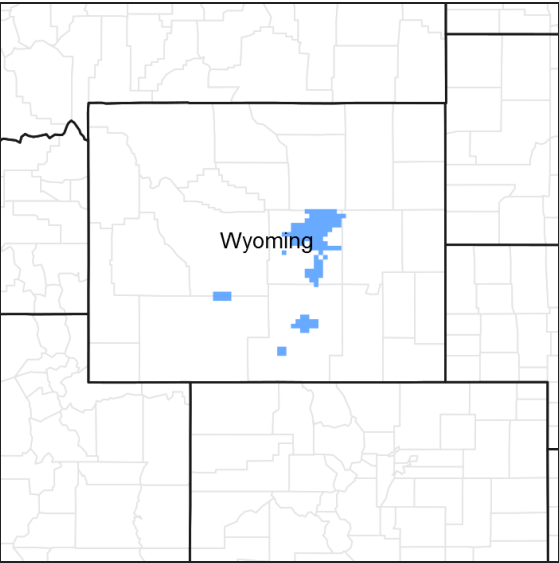


Figure 1. Mapped extent

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 usually occurs in an upland position. Slopes vary from 1 to 70%, but are mostly 5 to 25%.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,500 ft
Slope	1–70%

Ponding depth	0 in
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)	14 in

Influencing water features

Stream type: None

Soil features

The soils of this site are very shallow well-drained soils formed from residuum. This site usually occurs on steep slopes or hilltops. The soil is generally less than 10 inches deep with many outcrops of clay shale bedrock. These clay shales are usually saline or alkaline in various degrees, and normally produce some halophytic species. Runoff is rapid and erosion is often severe.

Table 4. Representative soil features

Surface texture	(1) Clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderate
Soil depth	2–10 in

Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1–2 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

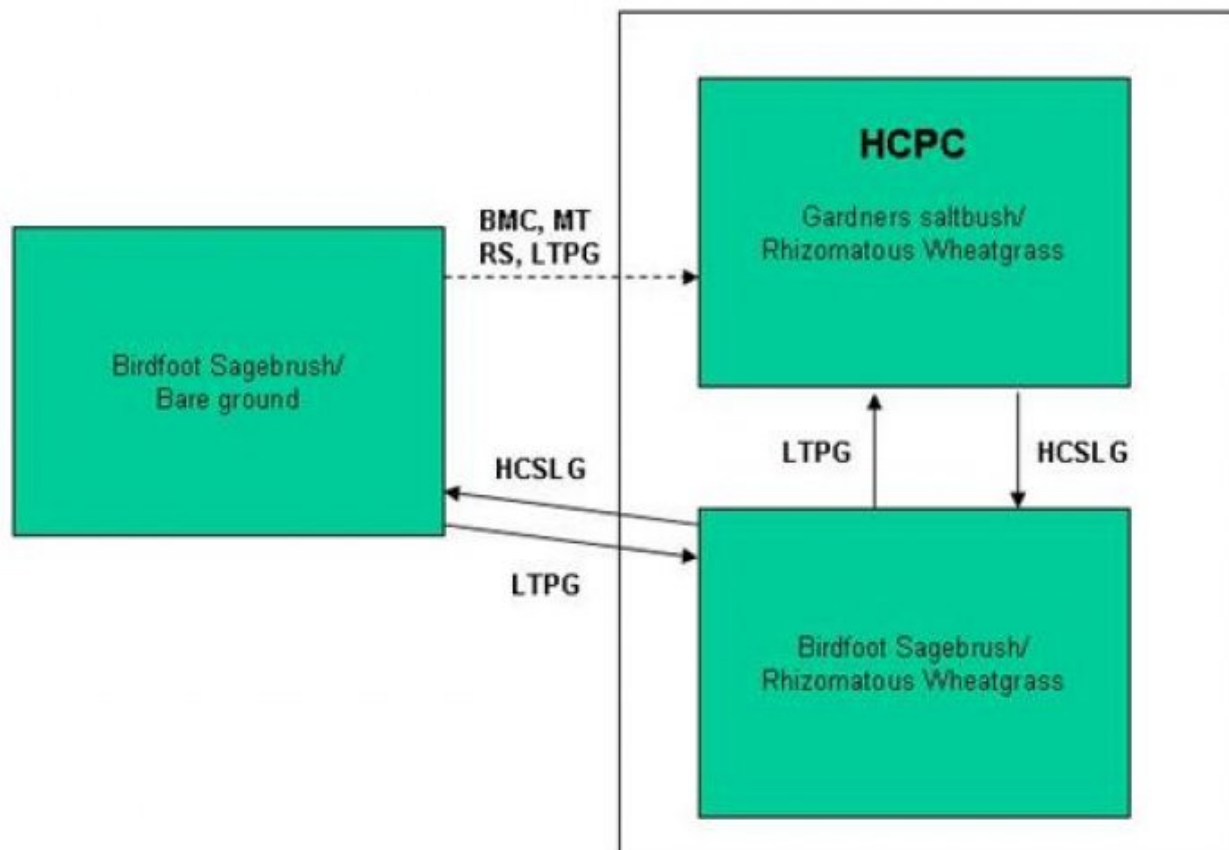
Ecological dynamics

As this site deteriorates from improper grazing management, species such as birdfoot sage and unpalatable forbs will increase. Indian ricegrass and bottlebrush squirreltail will decrease in frequency and production.

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

Gardner's Saltbush/Rhizomatous Wheatgrass Plant Community (HCPC)

Community 1.1

Gardner's Saltbush/Rhizomatous Wheatgrass Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 70% grasses or grass-like plants, 10% forbs and 20% woody plants. The major grasses include western wheatgrass, Indian ricegrass, bottlebrush squirreltail, and inland saltgrass. Gardner's saltbush is the major woody plant. Other woody plants that may occur include birdfoot sagebrush and winterfat. A typical plant composition for this state consists of western wheatgrass 20-50%, bottlebrush squirreltail 5-10%, Indian ricegrass 5-10%, inland saltgrass 5-10%, other grasses 5-15%, perennial forbs 5-10%, Gardners saltbush 10-20%, and 1-5% other woody species. Ground cover, by ocular estimate, varies from 10-20%. The total annual production (air-dry weight) of this state is about 300 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 400 lbs./acre in above average years. This state is extremely stable and well adapted to the Cool Central Desertic Basins and Plateaus climate. The diversity in plant species allows for high drought resistance. 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: • Heavy Continuous Season-long Grazing will convert the plant community to the Birdfoot Sagebrush/Rhizomatous Wheatgrass Plant Community.

Figure 3. 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

Birdfoot Sagebrush/Rhizomatous Wheatgrass Plant Community

Community 2.1

Birdfoot Sagebrush/Rhizomatous Wheatgrass Plant Community

This plant community is the result of heavy continuous season long grazing of the HCPC. Birdfoot sage and rhizomatous wheatgrass dominate. Birdfoot sagebrush usually comprises 50-60% of annual production. When compared to the HCPC, Gardners saltbush and bunch grasses have decreased, rhizomatous wheatgrass remains and birdfoot sage has increased. The total annual production (air-dry weight) of this state is about 200 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 300 lbs./acre in above average years. The soil is not protected and erosion will increase if management is not changed. The biotic integrity may be reduced due to low vegetative production. The watershed is functioning at risk. Transitional pathways leading to other plant communities are as follows: • Prescribed Grazing or Long-term Prescribed Grazing will return this state to near Historic Climax Plant Community (Gardners Saltbush/Rhizomatous Wheatgrass Plant Community). • Heavy Continuous Season-long Grazing will convert the plant community to the Birdfoot Sagebrush/Bare ground 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 3

Birdfoot Sagebrush/Bare Ground Plant Community

Community 3.1

Birdfoot Sagebrush/Bare Ground Plant Community

This plant community is a result of heavy continuous season-long grazing. Severe hoof compaction typically occurs

due to fine soil textures. Birdfoot sage increases to 60-80% of the annual production. Rhizomatous wheatgrass and Sandberg bluegrass are sparse. The total annual production (air-dry weight) of this state is about 50 pounds per acre, but it can range from about 25 lbs./acre in unfavorable years to about 100 lbs./acre in above average years. This state is unstable and vulnerable to excessive erosion. The biotic integrity of this plant community is at risk or non-functioning. The watershed is usually at risk or non-functioning as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Mechanical Treatment (Chiseling, etc.), Brush Management, and Reseeding followed by Prescribed Grazing or Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Gardners Saltbush/Rhizomatous Wheatgrass 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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				60–150	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	60–150	–
2				15–30	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	15–30	–
3				15–30	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	15–30	–
4				15–30	
	saltgrass	DISP	<i>Distichlis spicata</i>	15–30	–
5				15–45	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–15	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–15	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–15	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0–15	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	0–15	–
Forb					
6				15–30	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–15	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–15	–
	desertparsley	LOMAT	<i>Lomatium</i>	0–15	–
	tufted evening primrose	OECA10	<i>Oenothera caespitosa</i>	0–15	–
	beardtongue	PENST	<i>Penstemon</i>	0–15	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–15	–
	desert princesplume	STPI	<i>Stanleya pinnata</i>	0–15	–
	woodyaster	XYLOR	<i>Xylorhiza</i>	0–15	–
Shrub/Vine					
7				30–60	
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	30–60	–
8				0–15	
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	0–15	–
9				0–15	
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–15	–
10				0–15	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–15	–

Animal community

Animal Community – Wildlife Interpretations

Gardners Saltbush/Rhizomatous Wheatgrass Plant Community (HCPC): Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Due to the sparseness of the vegetation, this community does not provide escape and thermal cover for large ungulates or nesting habitat for sage grouse.

Birdfoot Sagebrush/ Rhizomatous Wheatgrass 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.

Birdfoot Sagebrush/*Bare Ground* Plant Community: This plant community has a low level of diversity. Areas of bare ground may provide leks for sage grouse.

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)

Gardners Saltbush/Rhizomatous Wheatgrass (HCPC) 200-400 0.1

Birdfoot Sagebrush/ Rhizomatous Wheatgrass 100-300 0.06

Birdfoot Sagebrush/ Bare ground 25-100 0.01

* - 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 D. Infiltration ranges from slow to very slow. Runoff potential for this site varies from high to very high depending on ground cover (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. Cryptogammic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides limited hunting opportunities.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Inventory Data References (narrative)

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

Approval

Kirt Walstad, 5/01/2024

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)	B. Brazee, Mark Shirley
Contact for lead author	
Date	05/01/2005
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills will be continuous.

2. **Presence of water flow patterns:** Water flow paths will be obvious, regular and continuous with debris dams occurring only on lesser slopes.

3. **Number and height of erosional pedestals or terracettes:** Erosional pedestals present with terracettes present at debris dams.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 75 to 85%.

5. **Number of gullies and erosion associated with gullies:** Active gullies may be present on steeper slopes.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

-
7. **Amount of litter movement (describe size and distance expected to travel):** Plant litter movement is expected.
-
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 20% or greater of soil surface. Stability class anticipated to be 3 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:** Sparse plant canopy (8% maximum), slow infiltration rates, and the high amount of bare ground contribute to a naturally high runoff rate 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 would be expected but soil surface is typically crusted and hard to very hard when dry.
-
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 rhizomatous grasses > Mid stature bunch 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):** Some plant mortality and decadence (10 to 15%) is expected on this site.
-
14. **Average percent litter cover (%) and depth (in):** Litter cover is in contact with soil surface with little evidence of biological activity.
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 300 lbs/acre
-
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: Annuals, unpalatable forbs, and Species found on Noxious Weed List.

17. **Perennial plant reproductive capability:** Limited ability to reproduce.
-