USDA Natural Resources
Conservation Service

Ecological site R034AY254WY
Shale Foothills and Basins West (Sh)

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.

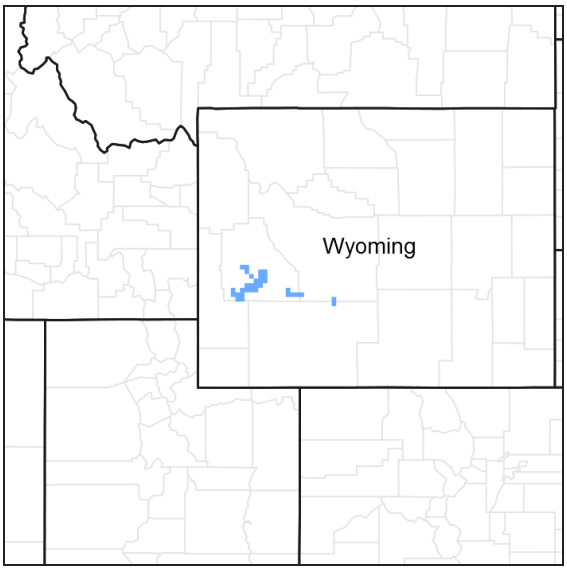


Figure 1. Mapped extent

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.

Associated sites

R034AY222WY	**Loamy Foothills and Basins West (Ly)** Loamy
R034AY250WY	**Sandy Foothills and Basins West (Sy)** Sandy
R034AY258WY	**Shallow Clayey Foothills and Basins West (SwCy)** Shallow Clayey
R034AY276WY	**Very Shallow Foothills and Basins West (VS)** Very Shallow

Similar sites

R034AY244WY	**Saline Upland Foothills and Basins West (SU)** Saline Upland 10-14W has higher production and is often located in a lowland, lesser sloping position.
R034AY154WY	**Shale Green River and Great Divide Basins (Sh)** Shale 7-9GR has lower production.

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%. Elevation ranges from 6500 to 7500 feet with most of the area above 7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	6,500–7,500 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 August 15. Some green up of cool season plants usually occurs in September depending upon fall moisture occurrences.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=wy website. Other climate stations representative of this precipitation zone include ”Border 3 N ” and Kemmerer Wtr Trtmt” in Lincoln County; “Evanston 1 E” in Uinta County; and “Merna” in Sublette County.

Table 3. Representative climatic features

Frost-free period (average)	67 days
Freeze-free period (average)	97 days
Precipitation total (average)	14 in

Influencing water features

There are no water features associated with this site.

Soil features

The soils of this site are very shallow well-drained soils formed from residuum. This site usually occurs on steep

slopes. 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.

Major soil series correlated to this site include: Wiscow.

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, bare ground and annual forbs will increase. Indian ricegrass and Gardner’s saltbush will decrease in frequency and production. This site has relatively low productivity potential, and is not well suited to grazing improvement practices unless treated as part of a larger unit containing more productive areas.

These plant communities narratives may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones 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.

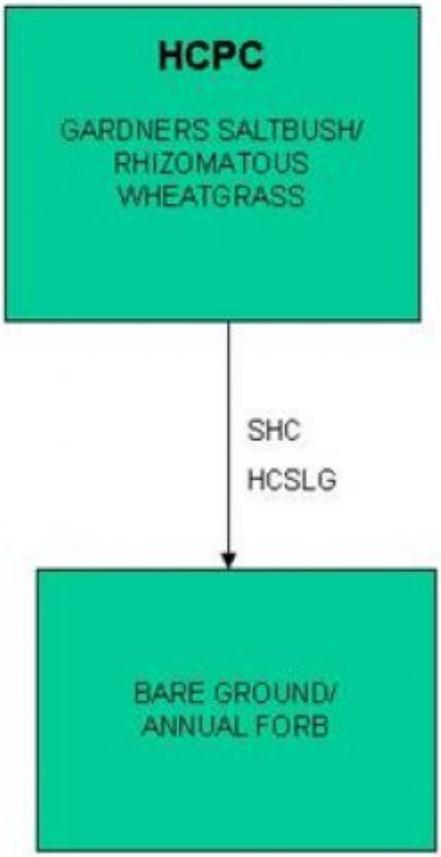
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical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

Site Type: Rangeland
MLRA: 34A-Cool Central Desertic Basins and Plateaus

Shale (Sh) 10-14
R034AY254WY



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)

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 (HCPC)

Community 1.1
Gardner’s Saltbush/Rhizomatous Wheatgrass (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is about 65% grasses or grass-like plants, 10% forbs, and 25% woody plants. The major grasses include rhizomatous wheatgrass, Indian ricegrass, and bottlebrush squirreltail. Other grasses may include alkali sacaton and Sandberg bluegrass. Gardner’s saltbush, greenmolly summercypress, and winterfat are the dominant woody plants. A typical plant composition for this state consists of rhizomatous wheatgrass 10-30%, bottlebrush squirreltail 5-15%, Indian ricegrass 5-15%, other grasses 5-10%, perennial forbs 1-10%, Gardner’s saltbush 10-25%, greenmolly summercypress 1-10%, and winterfat 1-10%. Ground cover, by ocular estimate, varies from 10-20%. The total annual production (air-dry weight) of this state is about 250 pounds per acre, but it can range from about 150 lbs./acre in unfavorable years to about 350 lbs./acre in above average years. The state is fragile and adapted to the Cool Central Desertic Basins and Plateaus climatic conditions. The diversity in plant species allows for some drought resistance. This is a sustainable plant community, but is difficult to reestablish when damaged. (Site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Severe Hoof Compaction and/or Heavy Continuous Season-Long Grazing will convert this plant community to the Bare Ground/Annual Forb State.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	97	162	227
Shrub/Vine	150	63	88
Forb	15	25	35
Total	**262**	**250**	**350**

Figure 5. Plant community growth curve (percent production by month). WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

State 2
Bare Ground/Annual Forb

Community 2.1
Bare Ground/Annual Forb

This plant community is a result of frequent and severe grazing. The stand is composed of almost entirely rhizomatous wheatgrass and Gardner’s saltbush. A high amount of bare ground exists. The total annual production (air-dry weight) of this state is about 150 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 300 lbs./acre in above average years. The site is not well protected from excessive erosion. The biotic integrity of this plant community is usually intact but can be at risk depending on how far a shift has occurred in plant composition toward annual forbs and bare ground. The watershed is usually functioning but can become at risk when bare ground increases. Transitional pathways leading to other plant communities are as follows: It is not often practicable or economically feasible to convert this plant community at the present time.

Figure 6. Plant community growth curve (percent production by month). WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				25–75	
	western wheatgrass	PASM	*Pascopyrum smithii*	25–75	–
2				13–38	
	squirreltail	ELEL5	*Elymus elymoides*	13–38	–
3				13–38	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	13–38	–
4				13–25	
	Grass, perennial	2GP	*Grass, perennial*	0–13	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–13	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–13	–
Forb					
5				3–25	
	Forb, perennial	2FP	*Forb, perennial*	0–13	–
	textile onion	ALTE	*Allium textile*	0–13	–
	milkvetch	ASTRA	*Astragalus*	0–13	–
	fleabane	ERIGE2	*Erigeron*	0–13	–
	aster	EUCEP2	*Eucephalus*	0–13	–
	desertparsley	LOMAT	*Lomatium*	0–13	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–13	–
	beardtongue	PENST	*Penstemon*	0–13	–
	spiny phlox	PHHO	*Phlox hoodii*	0–13	–
	dock	RUMEX	*Rumex*	0–13	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–13	–
	princesplume	STANL	*Stanleya*	0–13	–
Shrub/Vine					
6				25–63	
	Gardner's saltbush	ATGA	*Atriplex gardneri*	25–63	–
7				3–25	
	green molly	BAAM4	*Bassia americana*	3–25	–
8				3–25	
	winterfat	KRLA2	*Krascheninnikovia lanata*	3–25	–

Animal community

Animal Community – Wildlife Interpretations

Gardner’s Saltbush/Rhizomatous Wheatgrass Plant Community (HCPC): When found adjacent to sagebrush dominated sites, this plant community is well suited for sage grouse lek sites. It is a common site for prairie dog towns, badgers, burrowing owls, and other ground-burrowing animals. Other species that would frequent this plant community include predators to these small mammals. It provides year-round habitat and important winter forage for antelope.

Bare Ground/Annual Forb Plant Community: This plant community may be useful 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.

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.

Plant Community Production (lb./ac) and Carrying Capacity* (AUM/ac)

Gardner's Saltbush/Rhizomatous Wheatgrass (HCPC) 150-350 lb./ac and .07 AUM/ac

Bare Ground/Annual Forb 50-300 lb./ac and .02 AUM/ac

* - 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 and usually salinity/alkalinity are the principal factors 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. 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 may be present. Water flow patterns may be present but should be barely distinguishable. Pedestals are only slightly present in association with bunchgrasses such as Indian ricegrass. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are sometimes present. Cryptogrammic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for some upland species such as pronghorn antelope and prairie dogs.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

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. Those involved in developing this site include: Bill Christensen,

Range Management Specialist, NRCS; Karen Clause, Range Management Specialist, NRCS; and Everet Bainter, Range Management Specialist, NRCS. 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.

Contributors

Karen Clause

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.

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Date	03/16/2007
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Some rills to be expected on this site. Depending on slope, rills range from .5-2 inches (1-5 cm) wide and are found every 3-6 feet (1-2 m).

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

3. **Number and height of erosional pedestals or terracettes:** Slight pedestalling evident.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 40-60%.

5. **Number of gullies and erosion associated with gullies:** Active gullies, if present, should be rare.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Minimal to nonexistent.

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move only in small amounts. Woody debris will show only slight movement down slope.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 3 (interspaces) to 6 (under plant canopy), but average values should be 3.5 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Typically an A-horizon of 1-5 inches (3-12 cm) with week granular or platy structure and brown to gray in color with OM of .5 to 1%.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 55-75% grasses, 10% forbs, and 15-35% shrubs. Minimal plant canopy (20-50%) and litter plus moderate to slow infiltration rates result in moderate runoff. Basal cover is typically less than 5% and does very little to effect runoff on this site.

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 exists, 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:

    Sub-dominant:

    Other:

    Additional: perennial shrubs>cool season rhizomatous grasses=mid-size, cool season bunchgrasses>>perennial forbs>short, cool season bunchgrasses

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.

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 15-50% expected. Herbaceous litter depth is typically shallow, ranging from 2-8mm. Woody litter can be up to an inch (3 cm).

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 150-350 lb/ac (250 lb/ac average); Metric: 168-392 kg/ha (280 kg/ha average).

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 80% is the most common indicator of a threshold being crossed. Spiny horsebrush, green rabbitbrush, Sandberg bluegrass, and phlox are common increasers. Annual weeds such as halogeton, kochia, and Russian thistle are common invasive species in disturbed sites.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years.
