USDA Natural Resources
Conservation Service

Ecological site EX043B23A154
Shale (Sh) Absaroka Lower Foothills

Last updated: 10/04/2019
Accessed: 07/17/2024

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.

MLRA notes

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

Major Land Resource Unit (MLRA) 43B: 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

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 < 60%
• Soils are:
- saline, sodic, saline-sodic, and/or gypsic
- Very Shallow (depth to restrictive layer is < 10” (25 cm).
- With < 30% cover of surface fragments (gravels, cobbles, stones)
- Textures usually range from silt loam to clay
- Clay content is ≥ 35% in mineral soil profile (0-10”).
- With an average particle size class ≥ 35% but < 60% clay

The Shale site concept is based on soils that are very shallow (depth to a paralithic or lithic (bedrock) contact is 10” (25 cm)). The underlying parent material or residuum is of shale or other salt-laden sedimentary bedrock.

The Shale ecological site is very similar and is generally associated with the Saline Upland Clayey ecological site. Cody shale and bentonite escarpments are common geology associated with this site. Shale ecological site is less than 10 inches to shale parent material (bedrock) and Saline Upland Clayey is greater than 10 inches. Saline Upland Clayey is typically found over shale bedrock or inter-bedded sedimentary bedrock, typically on lower gentler slopes, and in many cases will have a very similar plant community. The production potential and erosion hazard are the two interpretive characteristics that differ between these two sites.

Associated sites

R032XY358WY	**Shallow Clayey (SwCy) 10-14" East Precipitation Zone** Shallow Clayey will be found on the same landform as shale where the soils are deeper and where the salts are not as prevalent or are not present in the system.
R032XY344WY	**Saline Upland (SU) 10-14" East Precipitation Zone** Saline Upland site has similar plants but higher production and will occur down-slope or on deeper soils on the same landform as the Shale site.
R032XY376WY	**Very Shallow (VS) 10-14" East Precipitation Zone** Very Shallow soils are simlar to shale, however they lack the chemistry (salts) and are associated with sandstone or inter-bedded sedimentary bedrock where shales are found only on shale parent material. Very Shallow is found in association with Shale sites on exposed inter-bedded sedimentary uplifts.

Similar sites

R032XY254WY	**Shale (Sh) 5-9” Wind River Basin Precipitation Zone** Shale 5-9" Wind River Basin Precipitation zone is lower in production that this site.
R032XY154WY	**Shale (Sh) 5-9” Big Horn Basin Precipitation Zone** Shale 5-9" Big Horn Basin Precipitation zone is lower in production that this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex gardneri*
Herbaceous	(1) *Achnatherum hymenoides*

Legacy ID

R043BX554WY

Physiographic features

This site occurs on moderate to steep slopes and ridge tops.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Colluvial apron (2) Foothills > Erosion remnant (3) Foothills > Escarpment
Runoff class	Negligible to high
Elevation	1,646–2,286 m
Slope	0–60%
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% 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 15th and continues until about July 1st. 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 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)	64-106 days
Freeze-free period (characteristic range)	101-144 days
Precipitation total (characteristic range)	279-305 mm
Frost-free period (actual range)	46-118 days
Freeze-free period (actual range)	88-147 days
Precipitation total (actual range)	254-330 mm
Frost-free period (average)	80 days
Freeze-free period (average)	117 days
Precipitation total (average)	305 mm

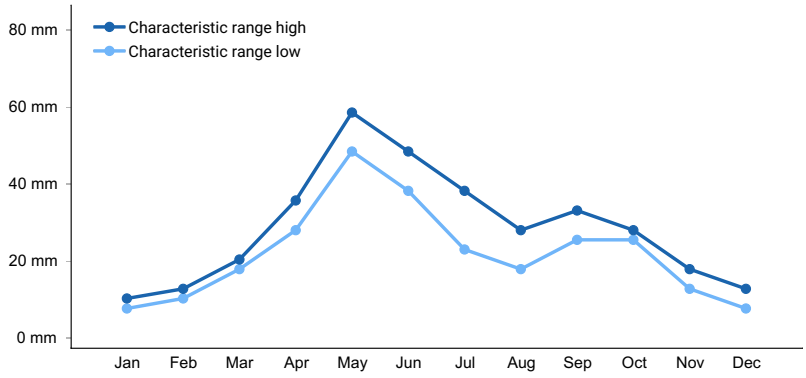


Figure 1. Monthly precipitation range

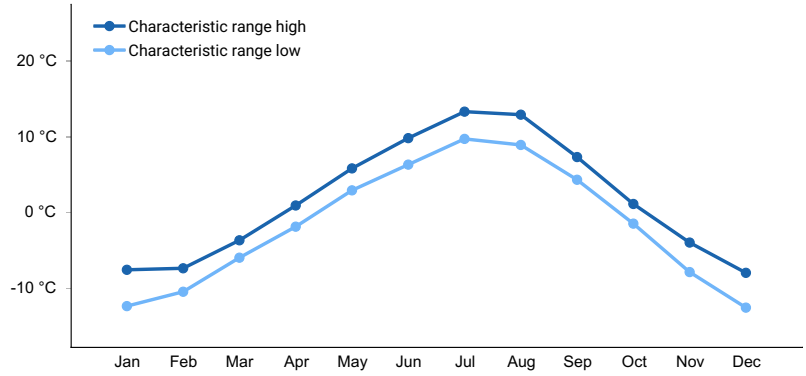


Figure 2. Monthly minimum temperature range

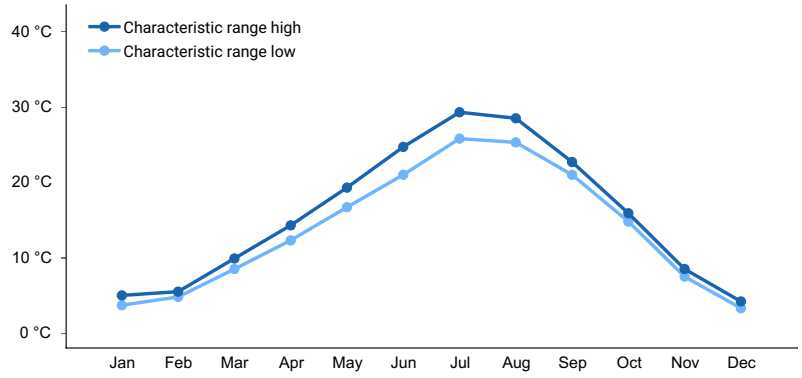


Figure 3. Monthly maximum temperature range

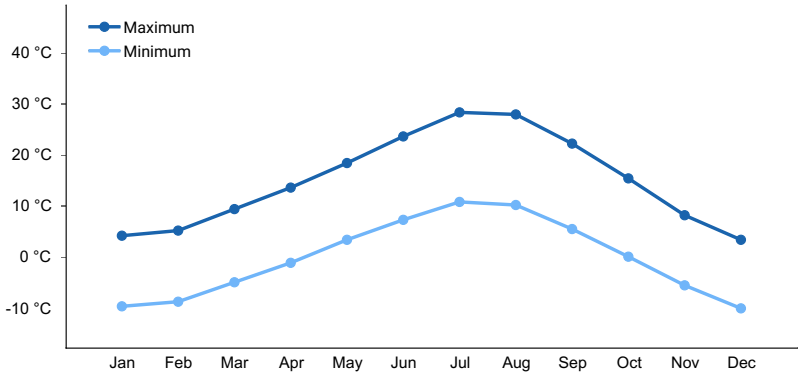


Figure 4. Monthly average minimum and maximum temperature

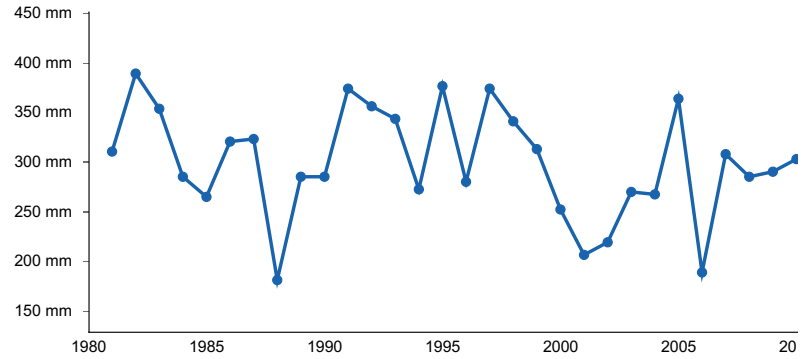


Figure 5. Annual precipitation pattern

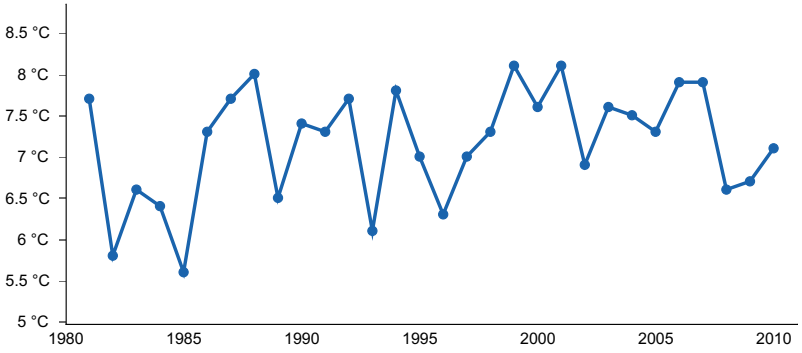


Figure 6. Annual average temperature pattern

Climate stations used

- (1) THERMOPOLIS [USC00488875], Thermopolis, WY
- (2) THERMOPOLIS 25WNW [USC00488888], Thermopolis, WY
- (3) SUNSHINE 3NE [USC00488758], Meeteetse, WY

- (4) CODY 21 SW [USC00481855], Cody, WY
- (5) WAPITI 1NE [USC00489467], Cody, WY
- (6) BUFFALO BILL DAM [USC00481175], Cody, 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. No streams are classified within this ecological site. The lack of water table above 60 in (150 cm) during any part of the growing season is a key factor for the Saline Upland sites. As the landscape transitions into the bottomlands (lowlands) or drainages, gaining overland flow and ground water influence changes the site to a saline lowland or saline subirrigated ecological site. In areas where there was historically a water table, but the stream or source has down cut or has been depleted, a site labeled Saline Lowland, Drained was created to cover a mixed or relict plant community.

Soil features

The soils of this site are very shallow (less than 10 inches to bedrock) well-drained soils formed from residuum. These soils have rapid to slow permeability and can be of any texture. This site usually occurs on steep slopes with many outcrops of shale bedrock. These clay shale soils are usually saline or alkaline in various degrees, and normally produce sparse stands of halophytes and saline tolerant grasses. The soil characteristics having the most influence on the plant community are the very shallow soils, which drastically reduces the amount of available moisture, and the potential quantities of soluble salts.

Major Soil Series correlated to this site include: No soils currently correlated to this ecological site.

Table 4. Representative soil features

Parent material	(1) Residuum–shale
Surface texture	(1) Parachannery clay loam (2) Loam (3) Silt loam (4) Silty clay loam (5) Clay
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Depth to restrictive layer	3–25 cm
Soil depth	3–25 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	1.52–5.08 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	3–40
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	5–20%

Ecological dynamics

Potential vegetation on this site is dominated by salt tolerant plants and drought resistant mid cool-season perennial grasses. The expected potential composition for this site is about 60% grasses, 5% forbs and 35% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

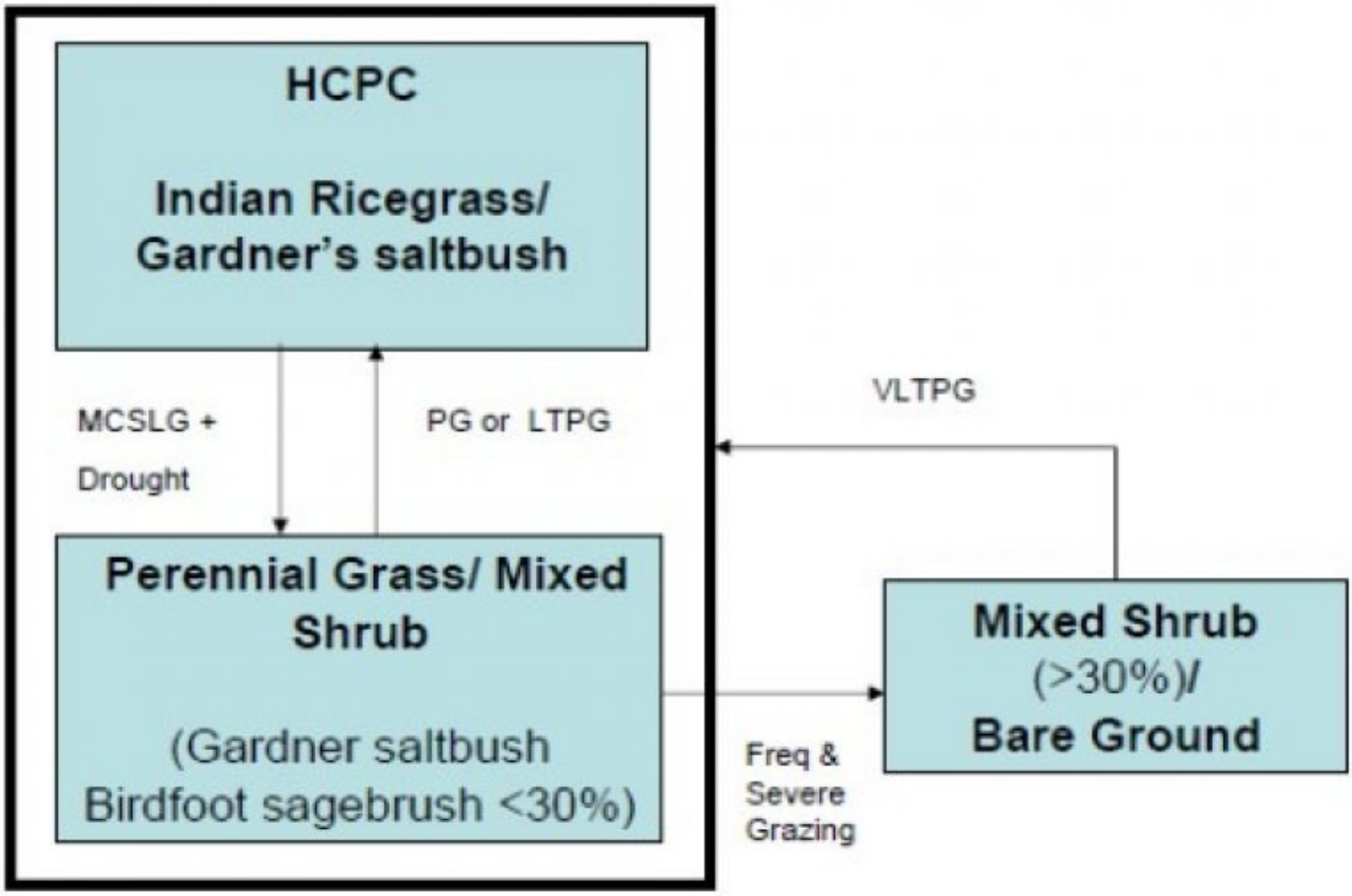
As this site deteriorates, species such as short warm-season grasses, birdfoot sagebrush and woodyaster will increase. Plains pricklypear and weedy annuals will invade. Cool season grasses such as Griffiths and bluebunch wheatgrasses and Indian ricegrass will decrease in frequency and production.

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.

Plant Community Narratives
Following are the narratives for each of the described plant communities. These plant communities 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.

State and transition model



BM - Brush Management (fire, chemical, mechanical)
Freq. & Severe Grazing - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season
GLMT - Grazing Land Mechanical Treatment
LTPG - Long-term Prescribed Grazing
MCSLG - Moderate, Continuous Season-long Grazing
NU, NF - No Use and No Fire
PG - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)
VLTPG - Very Long-term Prescribed Grazing (could possibly take generations)
WF - Wildfire

State 1
Indian Ricegrass/ Gardner's saltbush

Community 1.1
Indian Ricegrass/ Gardner's saltbush

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and droughty soils due to the very shallow depth to undeveloped salty weathered shale material. Historically, fire has not played an important role in this site due to the naturally sparse vegetation, which prohibits the spread of fire. Potential vegetation is about 60% grasses, 5% forbs, and 35% woody plants. Cool season midgrasses dominate the state. The major grasses include bluebunch wheatgrass, Indian ricegrass, and bottlebrush squirreltail. Other grasses occurring on the state include blue grama, rhizomatous wheatgrasses, and Sandberg bluegrass. Gardner's saltbush and birdfoot sagebrush are conspicuous elements of this state although a variety of shrubs can also occur. An array of forbs occurs in this state and plant diversity is high (see Plant Composition Table). The total annual production (air-dry weight) of this state is about 200 pounds per acre, but it can range from about 75 lbs./acre in unfavorable years to about 300 lbs./acre in above average years. The state is fragile and adapted to the Northern Intermountain Desertic Basins climate. The diversity in plant species allows for some drought resistance. This is a sustainable plant community, but is difficult to reestablish when damaged. Runoff and consequently, erosion is a normal part of this plant community due to the sparseness of the vegetation and the high potential of these soils to form a surface seal. Transitions or pathways leading to other plant communities are as follows: • Moderate, Continuous Season-Long grazing will convert this plant community to the Perennial Grass/Mixed Shrub Plant Community. Prolonged drought will exacerbate this transition.

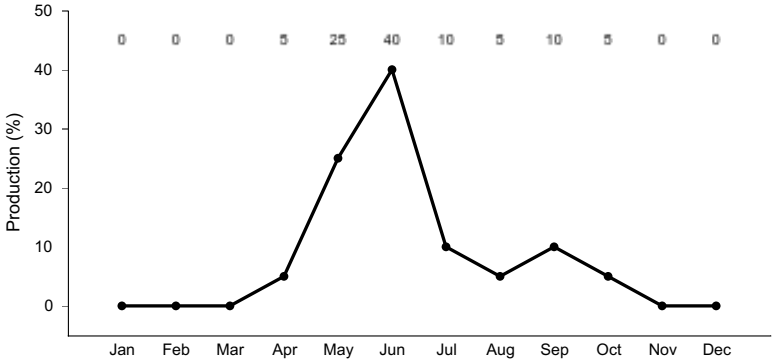


Figure 8. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

State 2
Perennial Grass/ Mixed Shrub

Community 2.1
Perennial Grass/ Mixed Shrub

Historically, this plant community evolved under grazing and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock and will be exacerbated by prolonged drought conditions. This plant community is still dominated by cool-season mid-grasses, while short warm-season grasses and miscellaneous forbs account for the balance of the understory. A variety of shrubs makes up the overstory. The dominant grasses include bluebunch wheatgrass, bottlebrush squirreltail, and rhizomatous wheatgrasses. Grasses of secondary importance include Sandberg bluegrass, blue grama, and alkali sacaton. Forbs commonly found in this plant community include smooth woodyaster, stemless mock goldenweed, Hood's phlox, sulfur flower buckwheat, Cous biscuitroot, and scarlet globemallow. Shrubs such as Gardner's saltbush, winterfat, birdfoot sagebrush, black sagebrush, and shadscale saltbush account for 20% to 30% of the total production. Plains pricklypear can also occur. When compared to the Historical Climax Plant Community, birdfoot sagebrush, shadscale, and smooth woody aster have increased. Indian ricegrass and bluebunch wheatgrass have decreased as the production of cool-season grasses has been reduced. Indian ricegrass may occur in only trace amounts under the shrub canopy or within the patches of pricklypear. Blue grama has increased. In addition, the amount of winterfat may or may not have changed depending on the season of use. 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 250 lbs./acre in above average years. This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement if

present are normally occurring, due to the potential of these sites to have an expected amount of normal runoff. Incidence of pedestalling can occur but should not be excessive. Soils are relatively stable and the surface shows some soil loss especially on steeper slopes. The watershed is functioning and the biotic community is intact. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing or possibly long-term prescribed grazing, will convert this plant community to the HCPC. The probability of this occurring is high especially if rotational grazing along with short deferred grazing is implemented as part of prescribed method of use. • Frequent and severe grazing over the long-term will convert this plant community to the Mixed Shrub/*Bare Ground* Plant Community.

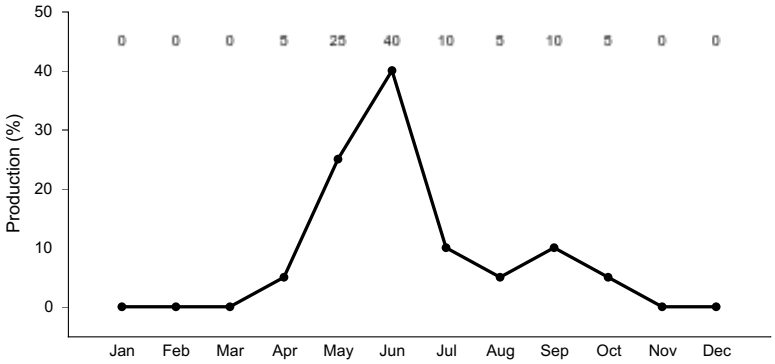


Figure 9. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

State 3
Mixed Shrub/ Bare Ground

Community 3.1
Mixed Shrub/ Bare Ground

This plant community currently is found under heavy, season-long grazing by livestock. A variety of shrubs and smooth woodyaster are significant components of this plant community. Bare ground is very prominent. Warm season grasses and annual plants can also be prominent. The dominant grasses/grasslikes are blue grama and threadleaf sedge. Cool-season grasses have been eliminated or significantly reduced. Weedy annual species such as cheatgrass, Russian thistle, and halogeton, may occur, if a seed source is available. Cactus often invades. Noxious weeds such as Russian knapweed may invade the site if a seed source is available. Birdfoot sagebrush, black sagebrush, skunkbush sumac, shadscale saltbush, Utah juniper, and other shrub species are significant components of this plant community. The interspaces between plants have expanded significantly leaving the amount of bare ground more prevalent. As a result, the herbaceous production has been significantly reduced. When compared with the Perennial Grass/Mixed Shrub Plant Community, the total annual production is less, however, the shrub production off sets some of the decline in the herbaceous production. The total annual production (air-dry weight) of this state is about 100 pounds per acre, but it can range from about 35 lbs./acre in unfavorable years to about 175 lbs./acre in above average years. This plant community is resistant to change. These areas are actually more resistant to fire as less fine fuels are available and the bare ground between the shrubs is increased. Continued frequent and severe grazing or the removal of grazing does not seem to affect the composition or structure of the plant community. Plant diversity is moderate to poor. The plant vigor is diminished and replacement capabilities are limited due to the reduced number of cool-season grasses. Plant litter is noticeably less when compared to the HCPC. Soil erosion is excessive and accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Runoff has greatly increased. Rill channels are usually noticeable in the interspaces and gullies have established where rills have concentrated down slope. Transitional pathways leading to other plant communities are as follows: • Very Long Term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community. Seeding native perennials may be necessary to hasten establishment of these species.

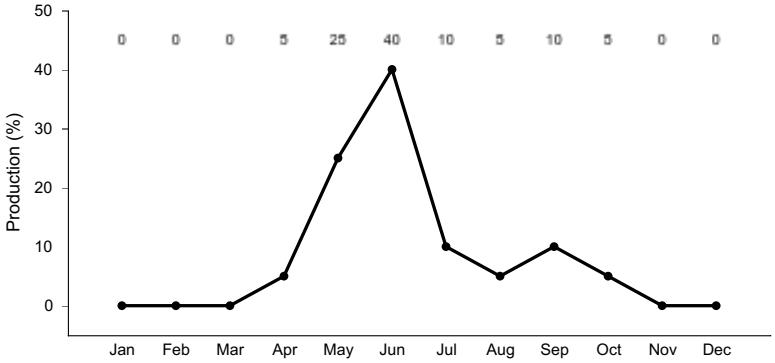


Figure 10. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

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				34–56	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	34–56	–
2				11–34	
	squirreltail	ELEL5	*Elymus elymoides*	11–34	–
3				0–22	
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–22	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–22	–
4				0–22	
	needle and thread	HECO26	*Hesperostipa comata*	0–22	–
5				22–45	
	Grass, perennial	2GP	*Grass, perennial*	0–11	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–11	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–11	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–11	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–11	–
Forb					
6				11–22	
	Forb, perennial	2FP	*Forb, perennial*	0–11	–
	fleabane	ERIGE2	*Erigeron*	0–11	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–11	–
	cous biscuitroot	LOCO4	*Lomatium cous*	0–11	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–11	–
	phlox	PHLOX	*Phlox*	0–11	–
	princesplume	STANL	*Stanleya*	0–11	–
	desert princesplume	STPI	*Stanleya pinnata*	0–11	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–11	–
	woodyaster	XYLOR	*Xylorhiza*	0–11	–
Shrub/Vine					

7				22–45	
	Gardner's saltbush	ATGA	*Atriplex gardneri*	22–45	–
8				0–22	
	birdfoot sagebrush	ARPE6	*Artemisia pedatifida*	0–22	–
9				22–45	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	–
	black sagebrush	ARNO4	*Artemisia nova*	0–11	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	0–11	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–11	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	0–11	–
	winterfat	KRASC	*Krascheninnikovia*	0–11	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–11	–

Animal community

Animal Community – Wildlife Interpretations

Historic Climax Plant Community: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer and antelope is limited due to the short growth forms 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. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Perennial Grass/Mixed Shrub: The combination of a shrubs grasses and forbs provide a diverse plant community for wildlife, but little overall available forage. Suitable thermal and escape cover for deer and antelope is limited due to the low growth forms of the woody plants. However, topographical variations could provide some escape cover. Some large ungulates especially antelope and upland game birds use this site during winter times for forage, as snow is not apt to accumulate on these sites.

Mixed Shrub/*Bare Ground*: This plant community provide little winter foraging for mule deer and antelope. Due to the sparseness of the vegetation, this community usually provides minimal escape and thermal cover for large ungulates or for nesting habitat for sage grouse. However, areas with topographical variations and pockets of juniper can provide sufficient escape cover for big game.

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)
Historic Climax Plant Community 75-300 .10
Perennial Grass/Mixed Shrub 50-250 .07
Mixed Shrub/*Bare Ground* 35-175 .02

* - 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 moderate. Runoff potential for this site varies from moderate 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 may be present but should be barely distinguishable. Pedestals are only slightly present in association with bunchgrasses such as bluebunch wheatgrass. 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 varieties of plants which bloom from spring until fall have an esthetic 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 new concept for Loamy and Loamy Calcareous Ecological site include: Ray Gullion, 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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Contributors

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Approval

Scott Woodall, 10/04/2019

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	05/01/2008
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).

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

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

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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: perennial shrubs mid-size, cool season bunchgrasses

    Sub-dominant: cool season rhizomatous grasses perennial forbs

    Other: short, cool season bunchgrasses

    Additional:

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).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 75 -300 lb/ac (188 lb/ac average); Metric: 84 -336 kg/ha (210 kg/ha 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 80% is the most common indicator of a threshold being crossed. Short warm season grasses, birdfoot sagebrush, Woodyaster 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.
