USDA Natural Resources
Conservation Service

Ecological site EX043B23A150
Sandy (Sy) Absaroka Lower Foothills

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General information

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

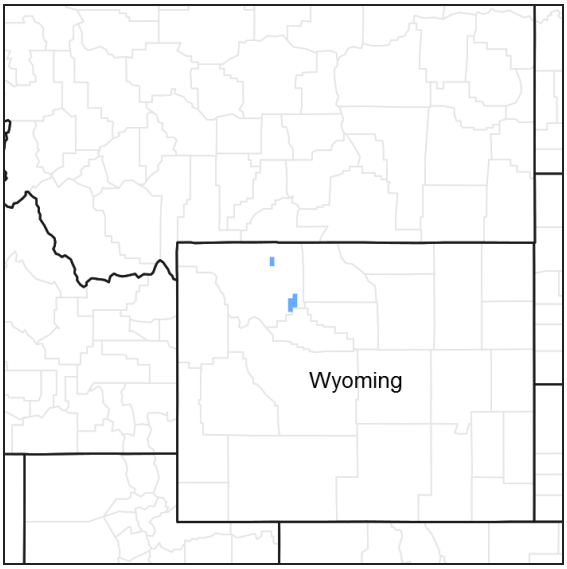


Figure 1. Mapped extent

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.

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
G302 Artemisia Tridentata - Artemisia tripartita - Purshia tridentata Big Sagebrush Steppe Group

Ecoregions (EPA):
Level I: 10 North American Deserts Level II: 10.1 Cold Deserts
Level III: 10.1.18 Wyoming Basin
Level IV: 10.1.18.b Big Horn Basin and
10.1.18.d Foothills and Low Mountains

Ecological site concept

• Site receives no additional water.
• Slope is <35%
• Soils are:
o Textures range from loamy sand to very fine sandy loam in top 4" (10 cm) of mineral soil surface
o Clay content is ≤18% in top 4" (10 cm) of mineral soil surface
o All subsurface horizons in the particle size control section have a weighted average of <18% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm's or from 25-100 cm's).
o Moderately deep to very deep (20-80+ in. (50-200+ cm))
o <3% stone and boulder cover and 20% or less cobble and gravel cover
o Not skeletal (<35% rock fragments) within 20" (50 cm) of mineral soil surface
o None to Slightly effervescent throughout top 20" (50 cm) of mineral soil surface

o Non-saline, sodic, or saline-sodic

The Sandy ecological site concept is based on minimal (none to slight) influence from salts, carbonates, gypsum or other chemistry within the top 20 inches (50 cm) of the mineral soil surface. The main soil characteristic is a moderately deep to very deep soil that is coarse textured with less than 18% clay throughout the soil profile; the dominant soil textural classes are loamy sand to sandy loam in the subsurface. The plant community transitions from sandy to loamy as the control section increases above 18% clays with increased rhizomatous wheatgrasses, additional forb species, and increased ground cover.

The sandy site can be found in several different catenas throughout the basin. In an escarpment catena it occurs with shallow and very shallow soils. Hillslope catenas have sandy and loamy occurring in a complex mosaic pattern where the geology is controlled by inter-bedded sandstone and shale; or in areas where the parent material is alluvial. Locations controlled by primarily sandstone bedrock, sandy sites can be found in structural-controlled stable areas adjacent to sandstone rock outcrop.

Associated sites

R032XY366WY	**Shallow Sandy (SwSy) 10-14" East Precipitation Zone** Shallow Sandy sites are generally located on the break of slopes, on or surrounding rock outcrops before it transitions into more gently rolling landforms with deeper soils. Similar plant communities with more pincushion forbs and a higher percentage of bluebunch wheatgrass, but a marked reduction in production and increased bare ground.
R032XY328WY	**Lowland (LL) 10-14" East Precipitation Zone** The Lowland site will have similar soils, outside of the presence of a water-table during parts of the year at a depth. This water-table influences the vegetation so have Basin big sagebrush, and other water demanding plants.
R032XY304WY	**Clayey (Cy) 10-14" East Precipitation Zone** The Clayey ecological site has similar production potential; however, responses to disturbance, management and climatic changes will be different. Location on the landscapes are similar, but Clayey sites tend to fall along alluvial drainages or below shale outcrops/outwashes. Exist together on inter-bedded sedimentary beds.
R032XY312WY	**Gravelly (Gr) 10-14" East Precipitation Zone** Gravelly sites have the potential for bluebunch wheatgrass, and lack production that Sandy sites hold, and are higher in “pincushion” forbs. They occur on hills slopes or ridges where the surface is wind swept exposing the gravels. Sandy occurs inward or down slope from the exposed alluvium.
R032XY322WY	**Loamy (Ly) 10-14" East Precipitation Zone** Loamy sites will also be similar in production, but again response to management, disturbance and climatic shifts will vary. Loamy sites are generally found in the central or posterior edge of a landform such as alluvial fans, fan aprons, outwashes, and pediments.

Similar sites

R032XY250WY	**Sandy (Sy) 5-9” Wind River Basin Precipitation Zone** Sandy 5-9" Wind River Basin Precipitation zone is lower in production than this site.
R032XY150WY	**Sandy (Sy) 5-9” Big Horn Basin Precipitation Zone,** Sandy 5-9" Big Horn Basin Precipitation zone is lower in production than this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia cana*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Hesperostipa comata*

Legacy ID

R043BX550WY

Physiographic features

This site occurs on nearly level to 35% slopes.

Table 2. Representative physiographic features

Landforms	(1) Foothills > Alluvial fan (2) Foothills > Erosion remnant (3) Foothills > Escarpment
Runoff class	Negligible to very high
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	1,646–2,286 m
Slope	0–35%
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

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. There may be isolated features that are affected by snow pack that persists longer than surrounding areas due to position on the landform (shaded/protected pockets).

Soil features

The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have moderately slow, moderate, moderately rapid, or rapid permeability. The surface soil will vary from 3 to 6 inches deep. Coarser topsoil’s may be included if underlain by finer textured subsoil. The soil characteristics having the most influence on plant community are light texture, which can affect the available moisture and amount of calcium carbonates in the profile.

Major Soil Series correlated to this site include: Carmondy, Cushool, Rock River

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone (2) Slope alluvium–interbedded sedimentary rock (3) Residuum–shale (4) Eolian deposits
Surface texture	(1) Fine sandy loam (2) Sandy loam (3) Loamy very fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately slow to rapid
Soil depth	51–152 cm
Available water capacity (0-101.6cm)	3.05–16 cm

Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4

Ecological dynamics

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes winterfat, big sagebrush, and a variety of forbs. The expected potential composition for this site is about 75% grasses, 15% forbs and 10% 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 threadleaf sedge, blue grama, and big sagebrush will increase. Plains pricklypear and weedy annuals will invade. Cool season grasses such as needleandthread, bluebunch and Griffith's wheatgrasses, Indian ricegrass, and rhizomatous wheatgrasses will decrease in frequency and production.

Big sagebrush may become dominant on areas with an absence of fire and sufficient amount of precipitation. Wildfires are actively controlled in recent times and as a resulted old decadent stands of big sagebrush persist. Chemical control using herbicides has replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

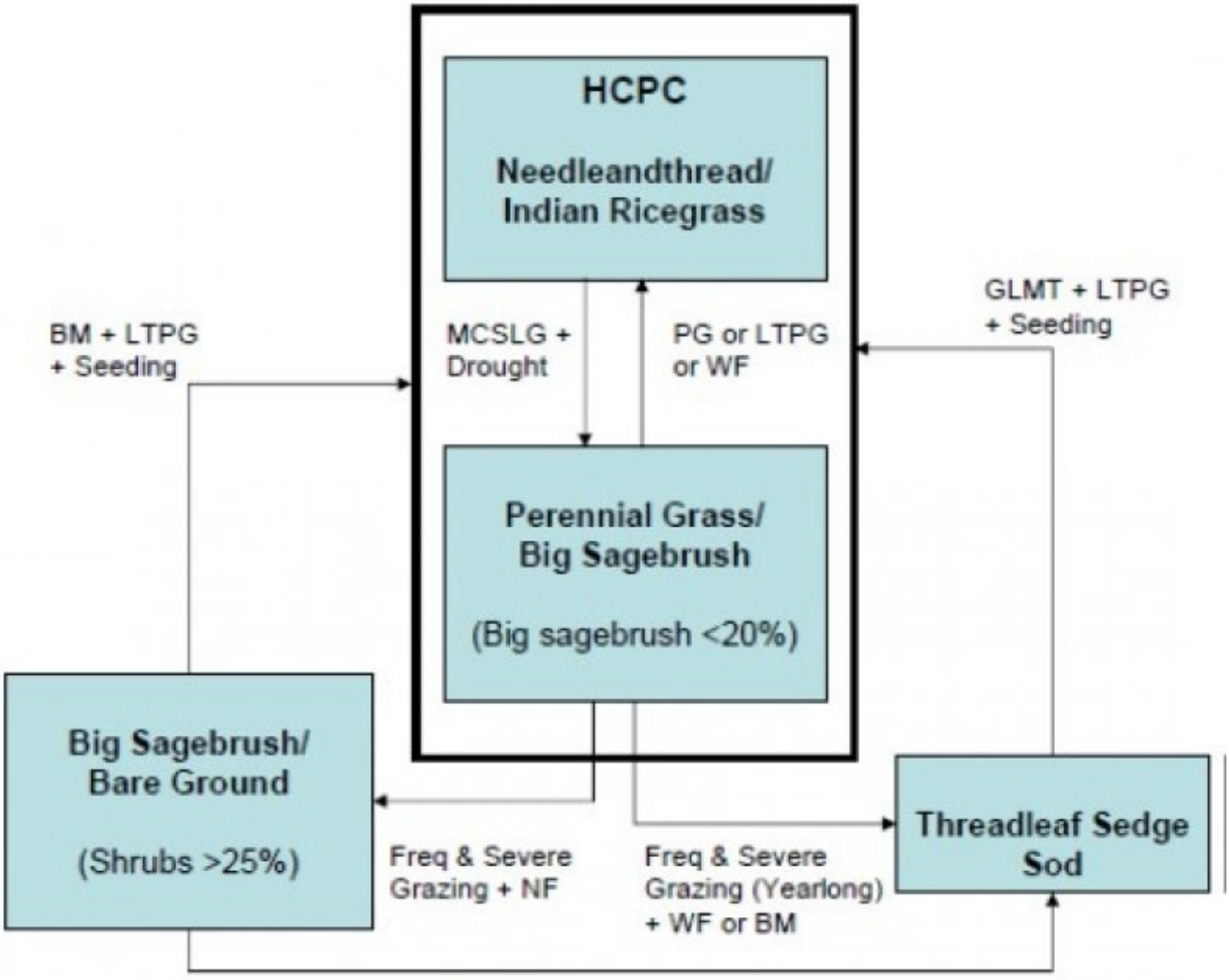
Due to the amount and pattern of the precipitation, the big sagebrush component may not be resilient once it has been removed or severely reduced if a vigorous stand of grass exists and is maintained. On these areas, threadleaf sedge and blue grama may become dominant if the area is subjected to a combination of frequent and severe grazing especially yearlong grazing. As a result, a dense sod cover of threadleaf sedge and blue grama will become established.

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.

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 (Natural or Human Caused)

State 1
Needleandthread/ Indian Ricegrass

Community 1.1
Needleandthread/ Indian Ricegrass

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and periodic fires. The cyclical natural of the fire regime in this community prevented big sagebrush from being the dominant landscape. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of rest. The state is comprised of mostly cool season mid-grasses and a variety of forbs and woody species. Potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The major grasses include needleandthread, Indian ricegrass, bluebunch and/or Griffith's wheatgrasses, and rhizomatous wheatgrasses. Other grasses occurring in the state include prairie junegrass, Sandberg bluegrass, blue grama, threadleaf sedge, and bottlebrush squirreltail. Spikefescue occurs on sites in the higher precipitation ranges of this zone. Big sagebrush and winterfat are conspicuous components of this state. A variety of forbs also 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 800 lbs./acre, but it can range from about 500 lbs./acre in unfavorable years to about 1100 lbs./acre in above average years. Transitions or pathways leading to other plant communities are as follows: • Moderate, Continuous Season-Long grazing will convert the plant community to the Perennial Grass/Big Sagebrush Plant Community. Prolonged drought will exacerbate this transition.

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	25	40	10	5	10	5		

State 2
Perennial Grass/ Big Sagebrush

Community 2.1
Perennial Grass/ Big Sagebrush

Historically, this plant community evolved under moderate 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. In addition, the fire regime for this site has been modified and extended periods without fire is now common. This plant community is still dominated by cool-season grasses, while short warm-season grasses and miscellaneous forbs account for the balance of the understory. Wyoming big sagebrush is now a conspicuous part of the overall production and accounts for the majority of the overstory. The major understory of grass and grass-like plants includes needleandthread, rhizomatous wheatgrasses, blue grama, threadleaf sedge, and Sandberg bluegrass. Forbs commonly found in this plant community include scarlet globemallow, fringed sagewort, lemon scurfpea, sulfur buckwheat, hairy goldaster, and phlox. Sagebrush can make up to 20% of the annual production. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community. When compared to the Historic Climax Plant Community, bluebunch and Griffith's wheatgrasses, Indian ricegrass, and winterfat have decreased. Indian ricegrass and bluebunch and Griffith's wheatgrasses may occur in only trace amounts under the sagebrush canopy or within the patches of pricklypear. Threadleaf sedge, blue grama, Sandberg bluegrass, and big sagebrush have increased. Plains pricklypear cactus will also have invaded, but occurs only in small patches. The total annual production (air-dry weight) of this state is about 650 pounds per acre, but it can range from about 400 lbs./acre in unfavorable years to about 950 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 may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. 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 the prescribed method of use. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. A prescribed fire treatment can be useful to hasten this transition if desired. • Frequent and severe grazing plus no fire, will convert the plant community to the Big Sagebrush/*Bare Ground* Plant

Community. The probability of this occurring is high. This is especially evident on areas with historically higher precipitation and also where no drought or heavy browsing has adversely impacted the sagebrush stand. • Frequent and severe grazing (yearlong grazing) plus wildfire or brush management, will convert the plant community to the Threadleaf Sedge Sod Plant Community. The probability of this occurring is high especially if the sagebrush stand has been severely affected by drought or heavy browsing or has been removed by wildfire or brush management.

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	25	40	10	5	10	5		

State 3
Big Sagebrush /Bare Ground

Community 3.1
Big Sagebrush /Bare Ground

This plant community is the result of frequent and severe grazing and protection from fire. Sagebrush eventually dominates this plant community, as the annual production of sagebrush will exceed 25%. The preferred cool season grasses have been eliminated or greatly reduced. The dominant grasses are Sandberg bluegrass, threadleaf sedge, and blue grama. Weedy annual species such as cheatgrass and kochia may occupy the site if a seed source is available. Patches of pricklypear cactus can be noticeable. Noxious weeds such as Russian knapweed, leafy spurge, or Canada thistle may invade the site if a seed source is available. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. As compared with the HCPC or the Perennial Grass/ Mixed Shrub Plant Communities, the annual production is less, however, the increase in shrub production compensates for some of the decline in the herbaceous production. The total annual production (air-dry weight) of this state is about 500 pounds per acre, but it can range from about 300 lbs./acre in unfavorable years to about 700 lbs./acre in above average years. This plant community is resistant to change as the stand becomes more decadent. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the sagebrush plants 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 accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Brush management, followed by prescribed grazing and possible reseeding, will return this plant community at or near the HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. In the case of an intense wildfire that occurs when desirable plants are not completely dormant, the length of time required to reach the HCPC may be increased and seeding of natives is recommended. • Brush management or wildfire, followed by frequent and severe grazing, will convert the plant community to the Threadleaf Sedge Sod Plant Community.

Figure 11. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	25	40	10	5	10	5		

State 4
Threadleaf Sedge Sod

Community 4.1
Threadleaf Sedge Sod

This plant community is the result of frequent and severe yearlong grazing, which have adversely affected the perennial grasses as well as the addition of other impacts that can affect the shrub component. These factors include drought and/or wildfires, heavy browsing, and/or human brush control measures. A dense sod of threadleaf sedge dominates this state. Pricklypear cactus can become dense enough in patches so that herbivores cannot graze forage growing within the cactus clumps. Big sagebrush has been reduced to small patches or in some cases removed. Rubber rabbitbrush may be the sole remaining shrub on the site. When compared to the Historic Climax Plant Community, threadleaf sedge and blue grama have increased. Pricklypear has invaded. All cool-season mid-grasses, forbs, and most shrubs have been greatly reduced. Production has been significantly decreased. 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. This sod is extremely resistant to change and continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. The biotic integrity of this state is not functional and plant diversity is extremely low. Plant vigor is significantly weakened and replacement capabilities are limited due to the reduced number of cool-season grasses. The biotic integrity of this plant community is not intact. This sod bound plant community is very resistant to water infiltration. While this sod protects the site itself, off-site areas are affected by excessive runoff that can cause rills and gully erosion. Water flow patterns are obvious in the bare ground areas and pedestalling is apparent along the sod edges. Rill channels are noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. The watershed may or may not be functioning, as runoff may affect adjoining sites. Transitional pathways leading to other plant communities are as follows: • Grazing land mechanical treatment (chiseling, etc.) and reseeding and pricklypear cactus control (if needed), followed by prescribed grazing, will return this plant community to near Historic Climax Plant Community condition.

Figure 12. Plant community growth curve (percent production by month). WY0701, 10-14E upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	25	40	10	5	10	5		

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				135–269	
	needle and thread	HECO26	*Hesperostipa comata*	135–269	–
2				90–179	
	Montana wheatgrass	ELAL7	*Elymus albicans*	90–179	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	90–179	–
3				0–90	
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–90	–
4				0–90	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–90	–
5				90–179	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	90–179	–
6				0–90	
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–90	–
7				45–135	
	Grass, perennial	2GP	*Grass, perennial*	0–45	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–45	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–45	–
	squirreltail	ELEL5	*Elymus elymoides*	0–45	–

	[illegible]	[illegible]	[illegible]	[illegible]	
	spike fescue	LEKI2	*Leucopoa kingii*	0–45	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–45	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–45	–
Forb					
8				0–135	
	Forb, perennial	2FP	*Forb, perennial*	0–45	–
	textile onion	ALTE	*Allium textile*	0–45	–
	Franklin's sandwort	ARFR	*Arenaria franklinii*	0–45	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–45	–
	Missouri milkvetch	ASMI10	*Astragalus missouriensis*	0–45	–
	wavyleaf Indian paintbrush	CAAPM	*Castilleja applegatei ssp. martinii*	0–45	–
	Indian paintbrush	CASTI2	*Castilleja*	0–45	–
	little larkspur	DEBI	*Delphinium bicolor*	0–45	–
	larkspur	DELPH	*Delphinium*	0–45	–
	parsnipflower buckwheat	ERHE2	*Eriogonum heracleoides*	0–45	–
	fleabane	ERIGE2	*Erigeron*	0–45	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–45	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–45	–
	cinquefoil	POTEN	*Potentilla*	0–45	–
	lemon scurfpea	PSLA3	*Psoralidium lanceolatum*	0–45	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–45	–
	deathcamas	ZIGAD	*Zigadenus*	0–45	–
Shrub/Vine					
9				0–90	
	big sagebrush	ARTR2	*Artemisia tridentata*	0–90	–
10				9–90	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–45	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–45	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–45	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–45	–
	winterfat	KRASC	*Krascheninnikovia*	0–45	–
	yucca	YUCCA	*Yucca*	0–45	–

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 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. 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/Big Sagebrush Plant Community: The combination of an overstory of sagebrush and an understory of grasses and forbs provide a very diverse plant community for wildlife. The crowns of sagebrush tend to break up

hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range.

Big Sagebrush/*Bare Ground* Plant Community: This plant community can provide some winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides excellent escape and thermal cover for large ungulates, as well as nesting habitat for sage grouse.

Threadleaf Sedge Sod Plant Community: These communities provide limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover and if the Historic Climax Plant Community or the Perennial Grass/Big Sagebrush Plant Community is limiting. Generally, these are not target plant communities for wildlife habitat management.

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)
Historical Climax Plant Community 500-1100 .40
Perennial Grass/ Big Sagebrush 400-950 .30
Big Sagebrush/*Bare Ground* 300-700 .20
Threadleaf Sedge Sod 100-300 .10

* - 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 B, with localized areas in hydrologic group C. Infiltration potential for this site varies from moderately rapid to rapid depending on soil hydrologic group and ground cover. Runoff varies from low to moderate. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide 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:** Rare to nonexistent. Where present, short and widely spaced.

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

3. **Number and height of erosional pedestals or terracettes:** Rare to nonexistent.

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 10-30%.

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move only in small amounts (to leeward side of shrubs). Large woody debris from sagebrush will show no movement.

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 1 (interspaces) to 6 (under plant canopy), but average values should be 2.7 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil data is limited for this site. Described A-horizons vary from 2-30 inches (5-76 cm) with OM of 1 to 2%.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 60-75% grasses, 10% forbs, and 15-30% shrubs. Evenly distributed plant canopy (45-75%) and litter plus moderate to moderately rapid infiltration rates result in minimal runoff. Basal cover is typically less than 5% for this site and does very little to effect runoff on this site.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. A coarse, dry subsurface will often refuse a probe, causing misidentification of a compaction layer. Most soil profiles must be described by hand dug holes.

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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: Mid-size, cool season bunchgrasses

    Sub-dominant: perennial shrubs cool season rhizomatous grasses

    Other: perennial forbs short cool season bunchgrasses

    Additional:

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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.

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14. **Average percent litter cover (%) and depth (in):** Litter ranges from 15-30% of total canopy measurement with total litter (including beneath the plant canopy) from 30-70% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to a couple inches (4-6 cm).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 500-1100 lb/ac (800 lb/ac average); Metric 560-1232 kg/ha (896 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 50% is the most common indicator of a threshold being crossed. Big sagebrush, Threadleaf sedge, blue grama, Sandberg bluegrass, buckwheat, and phlox are common increasers. Annual weeds such as kochia, mustards, lambsquarter, 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.
