USDA Natural Resources
Conservation Service

Ecological site DX032X01B104
Clayey (Cy) Big Horn Basin Rim

Last updated: 9/05/2019
Accessed: 05/06/2024

General information

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

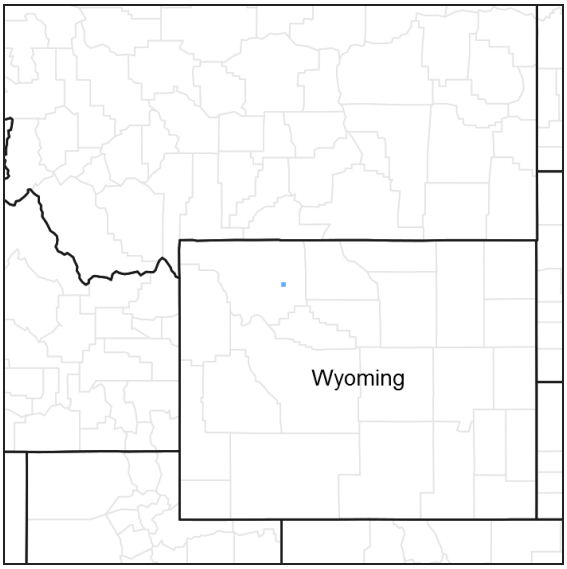


Figure 1. Mapped extent

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

MLRA notes

Major Land Resource Area (MLRA): 032X–Northern Intermountain Desertic Basins

Major land resource area (MLRA):

032X – Northern Intermountain Desertic Basins – This MLRA is comprised of two major Basins, the Big Horn and Wind River. These two basins are distinctly different and are split by LRU's to allow individual ESD descriptions. These warm basins are surrounded by uplifts and rimmed by mountains, creating a unique set of plant responses and communities. Unique characteristics of the geology and geomorphology single these two basins out.

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):

32X01B (WY): This LRU is the Big Horn Basin within MLRA 32. This LRU is lower in elevation, slightly warmer and

receives slightly less overall precipitation than the Wind River Basin (LRU 02). This LRU was originally divided into two LRU's - LRU A which was the core and LRU B which was the rim. With the most current standards, this LRU is divided into two Subsets. This subset is Subset B, referred to as the Rim, is a transitional band between the basin floor and the lower foothills. The subset encircles Subset A which was originally LRU A. As the LRU shifts towards the south and tracks east, changes in geology and relation to the mountain position, creates a minor shift in soil chemistry influencing the variety of ecological sites and plant interactions. 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: Ustic Aridic – Prior to 2012, many of the soils within this group were correlated as Frigid Ustic Aridic or as Mesic Typic Aridic, with few mapped within this cross over zone. As progressive soil survey mapping continues, these "crossover" or transitional areas are being identified and corrected.

Temperature Regime: Mesic
Dominant Cover: Rangeland, with Saltbush flats the dominant vegetative cover for this LRU/ESD.
Representative Value (RV) Effective Precipitation: 10-14 inches (254 – 355 mm)
RV Frost-Free Days: 105-125 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.g Big Horn Salt Desert Shrub Basin

Associated sites

R032XY350WY	**Sandy (Sy) 10-14" East Precipitation Zone** Sandy occurs with Clayey on landforms developed by inter-bedded sedimentary parent materials. Sandy sites tend to follow the sandstone outcrops or down-slope of these outcrops.
R032XY358WY	**Shallow Clayey (SwCy) 10-14" East Precipitation Zone** Shallow Clayey is lower in productivity and tends to fall on the upper rims of escarpments or on the eroded scarp faces; clayey will be lower on these landforms.
R032XY338WY	**Saline Lowland (SL) 10-14" East Precipitation Zone** Saline lowland sites will fall on the step or terrace below clayey sites, and are influenced by a water table and/or stream overflow.
R032XY344WY	**Saline Upland (SU) 10-14" East Precipitation Zone** Saline Upland sites tend to occur in a mosaic with clayey sites on landforms developed by inter-bedded marine sedimentary parent material.
R032XY322WY	**Loamy (Ly) 10-14" East Precipitation Zone** Loamy sites tend to follow the middle portion of most landforms developed by inter-bedded sedimentary bedrock, with clayey sites falling at the base (lower) of the landform where shales are exposed.

Similar sites

R032XY204WY	**Clayey (Cy) 5-9” Wind River Basin Precipitation Zone** Clayey Wind River Basin core site will be lower in production with a lower diversity of plant species.
R032XY104WY	**Clayey (Cy) 5-9” Big Horn Basin Precipitation Zone** Clayey Big Horn Basin core site will be lower in production with a lower diversity of plant species.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Pascopyrum smithii*

Legacy ID

R032XB104WY

Physiographic features

This site occurs on nearly level to 30% slopes.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin > Hill (2) Intermontane basin > Alluvial fan (3) Intermontane basin > Stream terrace
Runoff class	Very low to very high
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding duration	Brief (2 to 7 days)
Ponding frequency	Occasional
Elevation	1,646–2,286 m
Slope	0–30%
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 form the basin by high mountains but can occur in conjunction with an occasional thunderstorm. Growth of native cool-season plants begins about April 1st and continues to about July 1st. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October. For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/.

"Clark 3NE", "Cody", "Cody 12SE", "Heart Mtn", "Powell Fld Stn", "Shell 1NE", and "Thermopolis 9NE" are the representative weather stations within LRU. 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)	89-93 days
Freeze-free period (characteristic range)	114-122 days
Precipitation total (characteristic range)	178-279 mm
Frost-free period (actual range)	83-107 days
Freeze-free period (actual range)	111-125 days
Precipitation total (actual range)	178-305 mm
Frost-free period (average)	93 days
Freeze-free period (average)	118 days
Precipitation total (average)	229 mm

Climate stations used

- (1) CLARK 3NE [USC00481775], Powell, WY
- (2) HEART MTN [USC00484411], Powell, WY
- (3) POWELL FLD STN [USC00487388], Powell, WY
- (4) CODY [USC00481840], Cody, WY
- (5) CODY 12SE [USC00481850], Meeteetse, WY
- (6) THERMOPOLIS 9NE [USC00488884], Thermopolis, WY
- (7) SHELL 1NE [USC00488124], Shell, 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); but overflow is not a suitable fit. No streams are classified within this ecological site.

Soil features

The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, moderately well to well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow to moderate permeability. The surface soil will vary from 2 to 5 inches deep. These soils may develop severe cracks. The soil characteristics having the most influence on plants are the heavy texture, available moisture, and potential for elevated quantities of soluble salts.

Major Soil Series correlated to this site include: Abston, Absher, Havre, Poposhia

Table 4. Representative soil features

Parent material	(1) Residuum–calcareous shale (2) Alluvium–interbedded sedimentary rock
Surface texture	(1) Clay loam (2) Clay (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate

Soil depth	51–152 cm
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–12
Soil reaction (1:1 water) (0-101.6cm)	7.4–9

Ecological dynamics

Disclaimer This PROVISIONAL ecological site was developed for an extended MLRA concept where the foothills (10-14" precipitation Frigid climatic zone) was included in this site. This has created an exaggerated or elevated production value for this site description.

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes big sagebrush, winterfat, Gardner’s saltbush, birdfoot sagebrush, and a variety of forbs. The expected potential composition for this site is about 75% grasses, 10% forbs and 15% 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 blue grama, birdfoot sagebrush, and big sagebrush will increase. Plains pricklypear and weedy annuals will invade. Cool-season grasses such as Griffiths and bluebunch wheatgrass, western wheatgrass, bottlebrush squirreltail, and Indian ricegrass will decrease in frequency and overall production.

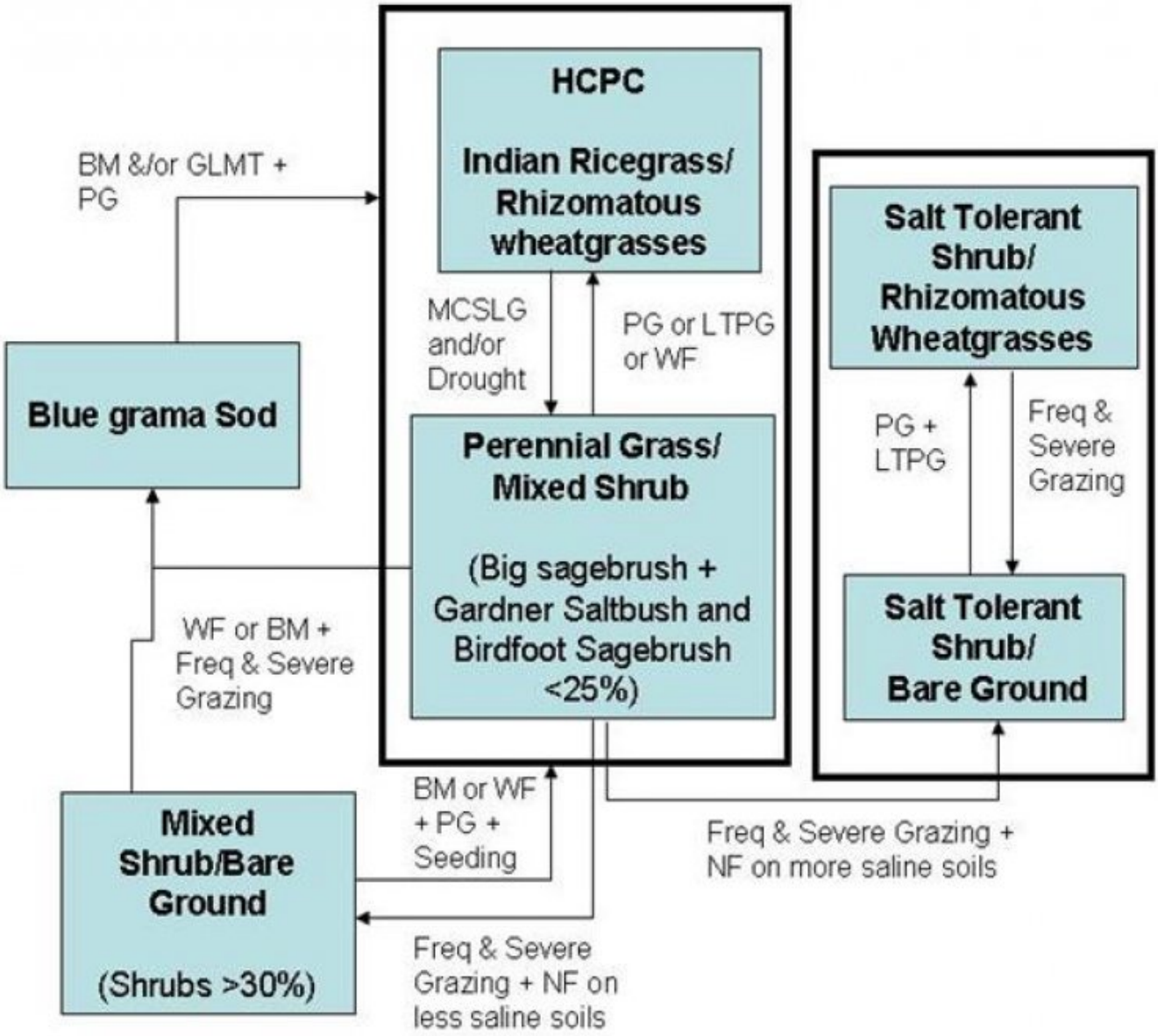
Big sagebrush may become dominant on some areas with an absence of fire. Wildfires are actively controlled in recent times so chemical control using herbicides has replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

Due to the amount and pattern of the precipitation, the big sagebrush component typically is not resilient once it has been removed if a healthy and vigorous stand of grass exists and is maintained. The exception to this is where the herbaceous component is severely degraded at the time of treatment, growing conditions are unfavorable after treatment, and/or recovery periods are inadequate due to poor grazing management.

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



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
Indian Ricegrass/Rhizomatous wheatgrasses

Community 1.1
Indian Ricegrass/Rhizomatous wheatgrasses

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 nature 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. Potential vegetation is about 75% grasses or grass-like plants, 10% forbs, and 15% woody plants. Cool season mid-grasses dominate the state. The major grasses include Indian ricegrass, western wheatgrasses, Griffiths and bluebunch wheatgrass, bottlebrush squirreltail, and mutton bluegrass. Green needlegrass may also be a major grass but will occur in the higher precipitation areas of this site. Other grasses occurring in this state include Sandberg bluegrass and blue grama. A mixture of woody species is a conspicuous element and occurs in mosaic patterns across the site. Wildfires occur periodically in this community and prevent big sagebrush from becoming a dominant species. A variety of forbs also occur 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 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1100 lbs./acre in above average years. The state is stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allow for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Drought, and moderate season long grazing with the absence of fire, will convert this plant community to the Perennial Grass/Mixed Shrub Plant Community.

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/Mixed Shrub

Community 2.1
Perennial Grass/Mixed Shrub

Historically, this plant community evolved under grazing by large ungulates and a low fire frequency. Currently, this site is normally found under a moderate, season-long grazing regime and in the absence of fire or brush control. Prolonged drought can also play an important role and will exacerbate these conditions. Big sagebrush, Gardner’s saltbush, and birdfoot sagebrush are important components of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, Griffiths and bluebunch wheatgrass, bottlebrush squirreltail, and mutton bluegrass. Forbs commonly found in this plant community, include woody aster, phlox, wild onion, false carrot, and scarlet globemallow. The annual production of shrubs has increased as compared to the HCPC and may become as much as 25% of the total percent composition of the plant community. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community. When compared to the Historic Climax Plant Community, big sagebrush, as well as other shrubs, and blue grama have increased. Plains pricklypear cactus has often invaded, but occurs only in small patches. Indian ricegrass has decreased and may occur in only trace amounts under the sagebrush canopy or within the patches of pricklypear. In addition, 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 600 pounds per acre, but it can range from about 400 lbs./acre in unfavorable years to about 900 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 return this state to near Historic Climax Plant Community. 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 with the absences of fire on less saline soils will convert this plant community to a Mixed Shrub/*Bare Ground* Plant Community. • Wildfire or brush management and frequent and severe grazing on less saline soils will convert this plant community to a Blue Grama Sod Plant Community. • Frequent and severe grazing plus no fire on more saline soils will convert this state to a Salt Tolerant Shrub/*Bare Ground* Plant Community.

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
Mixed Shrub/Bare Ground

Community 3.1
Mixed Shrub/Bare Ground

This plant community evolved under frequent and severe grazing with the absence of fire on less saline soils. Big sagebrush is the dominant species of this plant community. Cool-season grasses have been mostly eliminated and if still present can only be found under the sagebrush canopy. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements. The dominant grasses are Sandberg bluegrass and blue grama. Weedy annual species such as cheatgrass have invaded if a seed source is available. Cactus and sageworts often increase. Noxious weeds such as Russian knapweed, leafy spurge, or Canada thistle may invade the site. Plant diversity is moderate to poor. When compared with the HCPC or the Mixed Shrub/ Perennial Grass Plant Communities, the annual production is similar, as the shrub production compensates for 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 plant composition or structure of the plant community. Plant diversity is moderate to low. 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. Transitional pathways leading to other plant communities are as follows: • Brush Management or wildfire followed by frequent and severe grazing, will convert this plant community to a Blue Grama Sod Plant Community. • Brush management, followed by prescribed grazing and seeding if necessary, 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.

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

Blue grama sod

Community 4.1
Blue grama sod

This plant community is the result of frequent and severe yearlong grazing over a period of years. Soils on these sites show limited amounts of soluble salts. It is dominated by a dense sod of blue grama and includes a mosaic shrub overstory. Big sagebrush may be present but usually birdfoot sagebrush is the most important shrub in this plant community. Pricklypear cactus can become dense in areas so that livestock cannot graze forage growing within the cactus clumps. When compared with the Historic Climax Plant Community warm season grasses have replaced most cool season midgrasses. Blue grama, threadleaf sedge have increased. Pricklypear cactus 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. This state is stable and protected from excessive erosion. The sod formed by these grasses is resistant to water infiltration. While the soil is protected by this sod, excessive runoff may occur off-site. As a result, rills or other more severe erosion can occur on the adjoining sites. The watershed may or may not be functioning, as runoff may affect adjoining sites. The biotic integrity of this plant community is not intact. Transitional pathways leading to other plant communities are as follows: • Grazing land mechanical treatment (chiseling and seeding, etc.) followed by prescribed grazing will return this plant community to near Historic Climax Plant Community.

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		

State 5
Salt Tolerant Shrub/Bare Ground

Community 5.1
Salt Tolerant Shrub/Bare Ground

This plant community can occur on sites subjected to frequent and severe grazing and on soils influenced by elevated amount of soluble salts. Salt tolerant shrubs replace Wyoming big sagebrush as the major overstory species and the preferred cool season grasses have been eliminated or greatly reduced. Bare ground and weedy grasses and forbs dominate the understory. This site is dominated by an overstory of salt tolerant shrubs, such as greasewood, birdfoot sagebrush and saltbushes, which can vary widely in their composition and production. The leaves of some of these plants contain high amounts of sodium and other salts, and when shed these soluble salts are transferred to the soils underneath the plants. Consequently, the soil can exhibit wide variations in soluble salts, which can explain the variation in shrub composition. Big sagebrush and rubber rabbitbrush are present but are mostly in small patches. Perennial cool season mid-grasses have been removed leaving mostly patches of blue grama and annuals. Cheatgrass and weedy annual forbs such as halogeton, Russian thistle, and kochia, will occupy the site if a seed source is available. Noxious weeds such as Russian knapweed may also invade this site. Plant diversity is moderate to poor. When compared to the HCPC, grass production has diminished but is off set by the increase in shrub production. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. Surface salts have increased, especially on sites dominated by greasewood and saltbushes. The total annual production (air-dry weight) of this state is about 450 pounds per acre, but it can range from about 250 lbs./acre in unfavorable years to about 550 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 has 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 biotic integrity of this state is mostly dysfunctional because of the predominant salt tolerant shrub overstory and absence of perennial cool-season grasses. 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: • Prescribed grazing or possibly long-term prescribed grazing, will convert this plant community to the Salt Tolerant Shrub/Rhizomatous Wheatgrass Plant Community. Recovery to near Historic Climax Plant Community condition is difficult to impossible due to the resistance of these shrubs to herbicides and other brush management techniques. In addition, the increase in surface salts has had accumulated effects on the soil so most of the herbaceous plants associated with the HCPC are no longer suitable for this site. The most notable exception is the rhizomatous wheatgrasses and bottlebrush squirreltail. Soil remediation to reduce the surface salts is not recommended, as this is mostly ineffective and extremely costly. Seeding more salt-tolerant native grasses and forbs will improve the productivity of site and plant cover.

Figure 13. 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 6
Salt Tolerant Shrub/Rhizomatous Wheatgrasses

Community 6.1
Salt Tolerant Shrub/Rhizomatous Wheatgrasses

This plant community can occur where a prescribed grazing management practice is implemented on the Salt Tolerant/*Bare Ground* Plant Community. Salt tolerant shrubs and Wyoming big sagebrush still remain a significant component of the plant community but preferred cool season grasses have reestablished. This site is dominated by an overstory of a variety of shrubs, such as Wyoming big sagebrush, rubber rabbitbrush, greasewood, and a variety of saltbushes. Some perennial cool season mid-grasses have once again reestablished such as rhizomatous wheatgrasses and bottlebrush squirreltail. Other important grasses include Sandberg bluegrass and blue grama. Patches of annuals such as cheatgrass and other weedy annual forbs such as halogeton, Russian thistle, and kochia, will persist on this site. Noxious weeds such as Russian knapweed may also remain if not treated. The interspaces between plants will have diminished in size. When compared with the HCPC or the Mixed Shrub/ Perennial Grass Plant Communities, the annual production is similar, but the species are clearly unique as salt tolerant species are still present. 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 800 lbs./acre in above average years. This plant community is mostly resistant to change, but species composition can be altered through long-term overgrazing. The herbaceous component is stable and plant vigor and replacement capabilities are sufficient. The biotic community is not intact because of the predominant salt tolerant shrub overstory and the lack of cool-season climax grasses. Plant diversity is moderate Soils are mostly stable and recent soil loss is minimal. The remnant evidence of erosion should not be confused with current erosion processes. Water flow patterns and litter movement is stable but is still occurring on steeper slopes. Incidence of pedestalling is improving. The watershed may or may not be functioning Transitions or pathways leading to other plant communities are as follows: • Frequent and severe grazing will convert the plant community to the Salt Tolerant Shrub/*Bare Ground* Plant Community. • Recovery to near Historic Climax Plant Community condition is difficult to impossible due to the resistance of these shrubs to herbicides and other brush management techniques. In addition, the increase in surface salts has had accumulated effects on the soil so most of the herbaceous plants associated with the HCPC are no longer suitable for this site. The most notable exception is the rhizomatous wheatgrasses and bottlebrush squirreltail. Soil remediation to reduce the surface salts is not recommended, as this is mostly ineffective and extremely costly. Seeding more salt-tolerant grasses and forbs will improve the productivity of the site and plant cover, but will not improve the biotic integrity.

Figure 14. 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				90–224	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	90–224	–
2				90–179	
	Montana wheatgrass	ELAL7	*Elymus albicans*	90–179	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	90–179	–
3				90–224	
	western wheatgrass	PASM	*Pascopyrum smithii*	90–224	–
4				45–90	
	muttongrass	POFE	*Poa fendleriana*	45–90	–
5				0–90	
	squirreltail	ELEL5	*Elymus elymoides*	0–90	–
6				0–90	
	green needlegrass	NAVI4	*Nassella viridula*	0–90	–
7				45–90	
	Grass, perennial	2GP	*Grass, perennial*	0–45	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–45	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–45	–
	spike fescue	LEKI2	*Leucopoa kingii*	0–45	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–45	–
Forb					
8				0–90	
	Forb, perennial	2FP	*Forb, perennial*	0–45	–
	Indian paintbrush	CASTI2	*Castilleja*	0–45	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–45	–
	larkspur	DELPH	*Delphinium*	0–45	–
	threadleaf fleabane	ERFI2	*Erigeron filifolius*	0–45	–
	parsnipflower buckwheat	ERHE2	*Eriogonum heracleoides*	0–45	–
	fleabane	ERIGE2	*Erigeron*	0–45	–
	cous biscuitroot	LOCO4	*Lomatium cous*	0–45	–
	desertparsley	LOMAT	*Lomatium*	0–45	–
	lupine	LUPIN	*Lupinus*	0–45	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–45	–
	phlox	PHLOX	*Phlox*	0–45	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–45	–
	American vetch	VIAM	*Vicia americana*	0–45	–
Shrub/Vine					
9				90–179	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–45	–
	birdfoot sagebrush	ARPE6	*Artemisia pedatifida*	0–45	–

	big sagebrush	ARTR2	*Artemisia tridentata*	0–45	–
	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–45	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–45	–
	winterfat	KRASC	*Krascheninnikovia*	0–45	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	0–45	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–45	–

Animal community

Animal Community – Wildlife Interpretations

Indian Ricegrass/Rhizomatous Wheatgrasses (HCPC): 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/Mixed Shrub Plant Community: The combination of an overstory of sagebrush and an understory of grasses and forbs provides 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 a host of other nesting birds utilize stands in the 20-30% cover range.

Mixed Shrub/*Bare Ground* Plant Community: This plant community can provide important 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.

Blue Grama 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/Mixed Shrub Plant Community is limited. Generally, these are not target plant communities for wildlife habitat management.

Salt Tolerant Shrub/*Bare Ground* Plant Community: This plant community exhibits a low level of plant species diversity due to the accumulation of salts near the soil surface. It may provide some thermal and escape cover for deer and antelope if no other woody community is nearby, but in most cases, it is not a desirable plant community to select as a wildlife habitat management objective.

Salt Tolerant Shrub/Rhizomatous Wheatgrass Plant Community: The combination of an overstory of shrubs and an understory of grasses and forbs provide a very diverse plant community for wildlife. The crowns of the shrubs 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.

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 500-1100 .40
Perennial Grass/Mixed Shrub 400-900 .30
Mixed Shrub/Bare ground 300-700 .20
Blue Grama Sod 100-300 .10
Salt Tolerant Shrub/*Bare Ground* 250-550 .13
Salt Tolerant Shrub/Rhizomatous Wheatgrasses 400-800 .22

* - 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 C, with localized areas in hydrologic group D. Infiltration ranges from slow to moderately slow. Runoff potential for this site varies from moderate to 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 hydrologic 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 variety 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 here has been derived from NRCS inventory data. Field observations from range trained personnel was also used. Those involved in developing this site include: Chris Krassin, 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.

Approval

Scott Woodall, 9/05/2019

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	Marji Patz
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.

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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:** Rare to nonexistent.

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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 15-35%.

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

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

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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.

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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 3.0 or greater.

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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 1-8 inches (3-20 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 65-80% grasses, 15% forbs, and 5-20% shrubs. Evenly distributed plant canopy (45-70%) and litter, despite very slow to moderate infiltration rates result in slight to minimal runoff. Basal cover is typically less than 5% for this site 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):** None, but some 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: cool season rhizomatous grasses

    Sub-dominant: Mid-size, cool season bunchgrasses=short cool season bunchgrasses

    Other: perennial forbs perennial shrubs

    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 5-30% of total canopy measurement with total litter (including beneath the plant canopy) from 30-65% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to a couple inches (4-6 cm).

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).

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. Blue grama, Birdfoot sagebrush and Big Sagebrush are common increasers. Annual weeds such as kochia, mustards, lambsquarter, and Russian thistle are common invasive species in disturbed sites.

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