

Ecological site DX032X01B104

Clayey (Cy)

Big Horn Basin Rim

Last updated: 9/05/2019

Accessed: 08/12/2026

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): 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) <i>Artemisia tridentata ssp. wyomingensis</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Pascopyrum smithii</i>

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	1,650 – 2,290 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 from 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)	90-90 days
Freeze-free period (characteristic range)	110-120 days

Precipitation total (characteristic range)	180-280 mm
Frost-free period (actual range)	80-110 days
Freeze-free period (actual range)	110-130 days
Precipitation total (actual range)	180-310 mm
Frost-free period (average)	90 days
Freeze-free period (average)	120 days
Precipitation total (average)	230 mm

- (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	50 – 150 cm
Available water capacity (0-101.6cm)	7.62 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10

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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				90-224	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	90-224	–
2				90-179	
	Montana wheatgrass	ELAL7	<i>Elymus albicans</i>	90-179	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	90-179	–
3				90-224	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	90-224	–
4				45-90	
	muttongrass	POFE	<i>Poa fendleriana</i>	45-90	–
5				0-90	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-90	–
6				0-90	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0-90	–
7				45-90	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-45	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0-45	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-45	–
	spike fescue	LEKI2	<i>Leucopoa kingii</i>	0-45	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-45	–
Forb					
8				0-90	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-45	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-45	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0-45	–
	larkspur	DELPH	<i>Delphinium</i>	0-45	–
	threadleaf fleabane	ERFI2	<i>Erigeron filifolius</i>	0-45	–
	parsnipflower buckwheat	ERHE2	<i>Eriogonum heracleoides</i>	0-45	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-45	–
	cous biscuitroot	LOCO4	<i>Lomatium cous</i>	0-45	–
	desertparsley	LOMAT	<i>Lomatium</i>	0-45	–
	lupine	LUPIN	<i>Lupinus</i>	0-45	–
	leafy wildparsley	MUDI	<i>Musineon divaricatum</i>	0-45	–
	phlox	PHLOX	<i>Phlox</i>	0-45	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0-45	–

	American vetch	VIAM	<i>Vicia americana</i>	0-45	–
Shrub/Vine					
9				90-179	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-45	–
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	0-45	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0-45	–
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	0-45	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0-45	–
	winterfat	KRASC	<i>Krascheninnikovia</i>	0-45	–
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	0-45	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	0-45	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 9. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

Table 10. Community 6.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
-------	-------------	--------	-----------------	----------------------	------------------

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.

Author(s)/participant(s)	Ray Gullion, E. Bainter
Contact for lead author	ray.gullion@wy.usda.gov or 307-347-2456

Date	05/01/2008
Approved by	
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 15-35%.

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 3.0 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 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.
