

Ecological site DX032X01W174

Subirrigated (Sb)

Big Horn Basin Wet

Last updated: 10/04/2019

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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.

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): 32X01W (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 group is ambiguous of the two official subsets and will be referred to as Subset W, capturing those sites that are a factor of water or other processes outside of the general subset divisions (climate). As the LRU shifts outer edges, aspect and relation to the major bodies of water and taller landforms create minor shifts 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: Aquic, typic aridic, or ustic aridic. Temperature Regime: Mesic Dominant Cover: Rangeland, with Saltbush flats the dominant vegetative cover for this MLRA. Representative Value (RV) Effective Precipitation: 5-14 inches (127 – 355 mm) RV Frost-Free Days: 105-150 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

Ecological site concept

- Site influence by a water table below soil surface through the entire growing season (within 40 inches), and water may move over the surface from run-in but only for short periods.
- Slope is 6%
- Soils are: - Moderately deep, deep, or very deep (depth to restrictive layer is greater than 20" (50 cm). - Poorly to moderately well drained - Textures usually range from loamy sand to clay loam - Clay content is 60% in mineral soil surface 4". - With an average particle size class 40% clay - Not saline, sodic, or saline-sodic, gypsic

Associated sites

R032XY306WY	Clayey Overflow (CyO) 10-14" East Precipitation Zone Clayey Overflow sites occur upslope from subirrigated sites, on a terrace or alluvial fan. Clayey overflow lacks the influence from a water table and can be found on upland positions as well as lowland positions.
R032XY330WY	Overflow (Ov) 10-14" East Precipitation Zone Overflow sites occur upslope from subirrigated sites, on a terrace or alluvial fan. Overflow lacks the influence from a water table and can be found on upland positions as well as lowland positions.
R032XY328WY	Lowland (LL) 10-14" East Precipitation Zone Lowland sites are found in a complex with subirrigated and wetland sites. Subirrigated is the transition from the wettest site (wetland) to the drier site (lowland.)
R032XY378WY	Wetland (WL) 10-14" East Precipitation Zone Wetland sites are found in a complex with subirrigated and lowland sites. Subirrigated is the transition from the wettest site (wetland) to the drier site (lowland.)

Similar sites

R043BY374WY	Subirrigated (Sb) 15-19" Foothills and Mountains East Precipitation Zone Subirrigated 15-19
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Salix</i>
Herbaceous	(1) <i>Leymus cinereus</i> (2) <i>Elymus trachycaulus</i>

Legacy ID

R032XB174WY

Physiographic features

This site is located on nearly level land adjacent to streams that run water at least during the major part of the growing season.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin > Alluvial fan (2) Intermontane basin > Drainageway (3) Intermontane basin > Stream terrace (4) Intermontane basin > Flood plain
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to frequent
Elevation	1,650 – 2,290 m
Slope	0 – 10 %
Ponding depth	0 – 10 cm
Water table depth	30 – 150 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation and modeled relative effective annual precipitation ranges from 5 to 14 inches (127 – 355 mm). The normal precipitation pattern shows peaks in May and June and a secondary peak in September. The noted peaks account for approximately 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 approximately on April 1st and continues through to 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/>. "Basin", "Clark 3NE", "Cody", "Cody 12SE", "Emblem", "Greybull", "Heart Mtn", "Lovell", "Powell Fld Str", "Worland FAA AP", and "Worland" are the representative weather stations for LRU A. 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)	90-120 days
Freeze-free period (characteristic range)	120-140 days
Precipitation total (characteristic range)	180-230 mm
Frost-free period (actual range)	90-120 days
Freeze-free period (actual range)	110-150 days
Precipitation total (actual range)	180-250 mm
Frost-free period (average)	110 days
Freeze-free period (average)	130 days
Precipitation total (average)	200 mm

- (1) WORLAND [USC00489770], Worland, WY
- (2) WORLAND [USW00024062], Worland, WY
- (3) BASIN [USC00480540], Basin, WY
- (4) GREYBULL [USC00484080], Greybull, WY
- (5) EMBLEM [USC00483031], Burlington, WY
- (6) CODY 12SE [USC00481850], Meeteetse, WY
- (7) CODY [USC00481840], Cody, WY
- (8) HEART MTN [USC00484411], Powell, WY
- (9) POWELL FLD STN [USC00487388], Powell, WY
- (10) LOVELL [USC00485770], Lovell, WY
- (11) CLARK 3NE [USC00481775], Powell, WY

Influencing water features

The characteristics of these soils have influence from ground water that is within 40 inches of the soil surface and will be just below the surface for all of the growing season. Water over the surface from run-in may occur but only for short periods of time. These soils are moderately deep to deep and poorly to somewhat well drained.

Wetland description

No wetland classification determined for this site.
Stream Type: C (Rosgen)

Soil features

The soils of this site are moderately deep to very deep poorly drained to moderately well drained soils formed in mixed alluvium. These soils have slow to rapid permeability. These soils have water tables below the surface for all of the growing season. These areas may have water over the surface from run-in but only for short periods. The soil characteristics having the most influence on the plant community are depth to a water table during the growing season and the minimal amount of soluble salts.

Major Soil Series correlated to this site include:

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale
Surface texture	(1) Gravelly, cobbly, cobbly loam (2) Clay loam (3) Clay (4) Loamy sand (5) Sandy loam (6) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained to poorly drained
Permeability class	Slow to rapid
Soil depth	50 – 150 cm
Surface fragment cover $\leq 3"$	0 – 10 %
Surface fragment cover $> 3"$	0 – 10 %
Available water capacity (0-101.6cm)	5.59 – 16.76 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

Potential vegetation on this site is dominated by plants that can tolerate a water table near the surface for most of the growing season. Significant vegetation includes tall and mid cool season grasses, and a variety of riparian shrubs and forbs. The expected potential composition for this site is about 70% grasses, 10% forbs and 20% 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 willows, wild rose, and boxelder will increase. Weedy annuals and Kentucky bluegrass will invade. Cool season grasses such as basin wildrye and slender wheatgrass will decrease in frequency and production.

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

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

Plant Community Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC's) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				1412-2018	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	1412-2018	–
2				605-1009	
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	605-1009	–
3				404-1009	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-202	–
	Macoun's reedgrass	CACAM	<i>Calamagrostis canadensis var. macouniana</i>	0-202	–
	inland sedge	CAIN11	<i>Carex interior</i>	0-202	–
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	0-202	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0-202	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-202	–

Forb					
4				0-404	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-202	–
	yarrow	ACHIL	<i>Achillea</i>	0-202	–
	water hemlock	CICUT	<i>Cicuta</i>	0-202	–
	horsetail	EQUIS	<i>Equisetum</i>	0-202	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-202	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0-202	–
	common cowparsnip	HEMA80	<i>Heracleum maximum</i>	0-202	–
	iris	IRIS	<i>Iris</i>	0-202	–
	mint	MENTH	<i>Mentha</i>	0-202	–
	phlox	PHLOX	<i>Phlox</i>	0-202	–
	American bistort	POBI6	<i>Polygonum bistortoides</i>	0-202	–
	cinquefoil	POTEN	<i>Potentilla</i>	0-202	–
	buttercup	RANUN	<i>Ranunculus</i>	0-202	–
	dock	RUMEX	<i>Rumex</i>	0-202	–
	goldenbanner	THERM	<i>Thermopsis</i>	0-202	–
	clover	TRIFO	<i>Trifolium</i>	0-202	–
	swamp verberna	VEHA2	<i>Verbena hastata</i>	0-202	–
Shrub/Vine					
5				202-1009	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-202	–
	boxelder	ACNE2	<i>Acer negundo</i>	0-202	–
	water birch	BEOC2	<i>Betula occidentalis</i>	0-202	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0-202	–
	narrowleaf cottonwood	POAN3	<i>Populus angustifolia</i>	0-202	–
	Woods' rose	ROWOW	<i>Rosa woodsii</i> var. <i>woodsii</i>	0-202	–
	willow	SALIX	<i>Salix</i>	0-202	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0-202	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 6.1 plant community composition

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

Historic Climax Plant Community: The predominance of grasses and shrubs in this plant community favors grazers and mixed-feeders, such as bison, elk, moose, deer, and antelope. Suitable thermal and escape cover exists. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for upland game birds including sage grouse. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here. Slender Wheatgrass/Willow Plant Community: This plant community is extremely useful for the same large grazers that would use the Historic Climax Plant Community. It provides forage year around forage and cover and especially during critical times such as times of drought and winter. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for upland game birds including sage grouse. Good grasshopper habitat equals good foraging for birds. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here. Dense Riparian Shrub Plant Community: This plant community can provide important winter cover and forage for mule deer, moose, and antelope during that critical time. Grazers, however, will find little forage value in this state. The plant community composition comprises little diversity, and thus, less apt to meet all the seasonal needs of large grazers. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds. Bluegrass Sod/Riparian Shrub Plant Community : This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of some animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Dense Shrub/Short Grass Plant Community: The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. However, the plant community composition is less diverse and productive, and thus, less apt to meet the seasonal needs of these animals. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds. However, it provides little foraging opportunities for upland game birds, as fewer forbs are available. Many grassland obligate small mammals would occur here. Cool-Season Grass/Mixed Shrub Plant Community: The proximity to water makes this state important for wildlife such as birds, mule deer, and whitetail deer. The plant community composition is diverse, and able to meet the seasonal needs of these animals. It will provide foraging opportunities for upland game birds and sage grouse. Good grasshopper habitat equals good foraging for birds. Many grassland obligate small mammals would occur here. Animal Community – Grazing Interpretations The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These conservative estimates 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 2800-4500 2.0 Slender Wheatgrass/Willow 2600-3600 1.5 Dense Riparian Shrub 2600-3200 0.6 Bluegrass Sod/Riparian Shrub 2200-3000 1.0 Dense Shrub/Short Grass 1000-1800 .30 Cool-Season Grass/Mixed Shrub 1200-2400 .35 * - 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 and C, with localized areas in hydrologic group D. Infiltration ranges from moderately slow to rapid. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information). Rills and gullies should not typically be present. Water flow patterns 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 here has been derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing this 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.

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	05/02/2008
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rare to nonexistent.

2. **Presence of water flow patterns:** Water flow patterns sometimes evident in floodplain zone where this site occurs.

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 is typically less than 5%.

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: Minimal to nonexistent.

7. Amount of litter movement (describe size and distance expected to travel): Herbaceous litter exhibits slight movement only associated with water flow patterns.

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 typically 6.0.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil surface highly variable, from 2 to 20 inches (5-50 cm) in depth with OM of 1-3%.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Plant community consists of 55-75% grasses, 15% forbs, and 10-30% shrubs. Dense plant canopy (75-100%) and litter plus moderate to moderately rapid infiltration rates result in minimal to nonexistent runoff. Basal cover is typically greater than 5% for this site and effectively reduces runoff on this site.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): No compaction layer exists.

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 tall, cool season bunchgrasses

Sub-dominant: perennial shrubs rhizomatous grass-like

Other: perennial forbs cool season rhizomatous grasses

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 1-25% of total canopy measurement with total litter (including beneath the plant canopy) from 75-100% expected. Herbaceous litter depth typically ranges from 10-25 mm. Woody litter can be up to a couple inches (4-6cm).

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):
English: 2800 - 4500 lb/ac (3650 lb/ac average); Metric: 3136 - 5040 kg/ha (4088 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 20% and presence of noxious weeds or Kentucky bluegrass are the most common indicators of a threshold being crossed. Willows, wild rose, boxelder, Baltic rush, inland sedge and shrubby cinquefoil are common increasers. Kentucky bluegrass and Canada thistle are common invasive species.
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17. Perennial plant reproductive capability: All species are capable of reproducing, except in drought years.
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