

Ecological site DX032X01W140

Saline Lowland Drained (SLDr)

Big Horn Basin Wet

Last updated: 10/04/2019
Accessed: 08/17/2026

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): 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: 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 Saltbush Scrub Macrogroup G301 Atriplex corrugate – Artemisia pedatifida – Picrothamnus desertorum Dwarf-Scrub 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 receives additional moisture from surrounding uplands.
- Site exists along degraded (down-cut) channel systems that have had a significant drop in the water table.
- Slope is 6%
- Soils are:
 - o Textures range from sandy loam to clay in top 4" (10 cm) of mineral soil surface, and varies within profile.
 - o All subsurface horizons in the particle size control section have a weighted average of 18% clay. (The particle size control section is the segment of the profile from either the start of an argillic horizon for 50 cm's or from 25-100 cm's).
 - o Moderately deep to very deep (20-80+ in. (50-200+ cm)
 - o Not skeletal (35% rock fragments) within 20" (50 cm) of mineral soil surface, may have stratification with gravels.
 - o None to Slightly effervescent throughout top 20" (50 cm) of mineral soil surface
 - o Saline, sodic, or saline-sodic; but this may occur deeper in the profile (within rooting zone of woody species). These are saline soils found along drainage ways with a water table below rooting depth of woody plants, usually as a result of down cutting or gully erosion. Soils may not have visible salt chemistry, but plants are still indicating a salty environment (greasewood, gardner's saltbush, alkali sacaton, and inland saltgrass).

Associated sites

R032XY338WY	Saline Lowland (SL) 10-14" East Precipitation Zone Saline Lowland sites can be found within the active channel where saline lowland, drained are found on the upper banks of the down-cut portions of the channel.
R032XY344WY	Saline Upland (SU) 10-14" East Precipitation Zone Saline Upland are found up slope or a step above the saline lowland drained sites, on positions receiving no additional moisture.
R032XY328WY	Lowland (LL) 10-14" East Precipitation Zone Lowland sites can be found within the active channel and saline lowland, drained sites are found on the upper banks of the down-cut portions of the channel.
R032XY304WY	Clayey (Cy) 10-14" East Precipitation Zone Clayey sites are found up slope or a step above these lowland soils. Clayey also is lacking in the soil chemistry that is or was found in the saline lowland, drained site, on positions receiving no additional moisture.

Similar sites

R032XY240WY	Saline Lowland Drained (SLDr) 5-9" Wind River Basin Precipitation Zone Saline Lowland Drained within the Wind River Basin is lower in production.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Sarcobatus vermiculatus</i> (2) <i>Atriplex gardneri</i>
Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Achnatherum hymenoides</i>

Legacy ID

R032XB140WY

Physiographic features

This site normally occurs on land that receives overflow or runoff from adjacent slopes.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin > Alluvial fan (2) Intermontane basin > Drainageway (3) Intermontane basin > Stream terrace
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	1,650 – 2,290 m
Slope	0 – 10 %

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

Influencing water features

A degraded or down-cut stream channel has removed the historic water table from this site. Overflow during high spring run-off or snow melt provides additional moisture to this site. Site is generally adjacent to an active channel (ephemeral, intermittent or perennial). There may be instances of this site occurring in an upland position where a perched water table once existed.

Soil features

The soils of this site are moderately deep and very deep poorly to well-drained soils formed in alluvium. These soils have moderate to rapid permeability and are moderately to strongly saline and/or alkaline. Higher soluble salt concentrations may be found in the subsoils. The surface soil will be highly variable and vary from 2 to 8 inches in thickness. A water table if present is below 5 feet and is too deep to benefit the herbaceous species. These areas are subject to occasional overflow. The soil characteristics having the most influence on the plant community are the elimination of the water table near the surface, reduction in the potential to flood and the elevated quantities of soluble salts.

Major Soil Series correlated to this site include: Bunkwater, Lostwells, Fenton-like, Oregon Basin-like, Hiland-like, and Zigweid

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale
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Surface texture	(1) Loam (2) Clay loam (3) Silt loam (4) Clay (5) Sandy loam (6) Silty clay
Drainage class	Poorly drained to well drained
Permeability class	Moderate to moderately rapid
Soil depth	50 – 150 cm

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.

This site occurs as a direct result of a hydrologic disruption to the Saline Lowland 10-14 Foothills and Basins East ecological site (See Saline Lowland Ecological Site Description). This disturbance, whether natural or human caused, alters the hydrologic function of a Saline Lowland to such a degree that rehabilitation is not an option. As a result, subsoil that at one time was sufficiently moist during part of the growing season is literally drained as water is now diverted to deeply incised channels. Consequently, supplemental water that was predictable and available to herbaceous plants during part of the growing year is now lacking and the water table is permanently below the rooting depth of these plants. This site, however, gets occasional overflow from the adjacent uplands and the water table is commonly at a depth that is still beneficial to deep-rooted shrub species.

Potential vegetation on this site is dominated by tall and mid perennial grasses, which can tolerate soils with moderate amounts of salinity and/or alkalinity and adapt to periodic overflows. Other significant vegetation includes greasewood, rubber rabbitbrush, 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 inland saltgrass and greasewood will increase. Weedy annuals will invade. Grasses such as alkali sacaton, rhizomatous wheatgrasses, Indian ricegrass and basin wildrye 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				101-202	
	saltgrass	DISP	<i>Distichlis spicata</i>	101-202	–
2				101-202	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	101-202	–
3				101-202	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	101-202	–
4				50-151	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	50-151	–
5				0-101	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-50	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-50	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0-50	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0-50	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0-50	–
Forb					
6				0-101	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-50	–
	textile onion	ALTE	<i>Allium textile</i>	0-50	–
	povertyweed	IVAX	<i>Iva axillaris</i>	0-50	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0-50	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	0-50	–
	smooth woodyaster	XYGL	<i>Xylorhiza glabriuscula</i>	0-50	–
Shrub/Vine					
7				50-101	
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	50-101	–
8				10-50	
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	10-50	–
9				10-50	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-50	–
	basin big sagebrush	ARTRT	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	0-50	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-50	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0-50	–

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

Animal Community – Wildlife Interpretations Historic Climax Plant Community: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, deer, and antelope. Suitable thermal and escape cover for wildlife is available as quantities of woody plants are adequate. This plant community may provide brood rearing/foraging areas for upland game birds including sage grouse, especially when found adjacent to sagebrush dominated states. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles as well as upland game birds. Many grassland obligate small mammals would occur here. Inland Saltgrass/Rhizomatous wheatgrasses/greasewood: This plant community exhibits a high level of plant species diversity due to the accumulation of salts in the soil. It provides both thermal and escape cover for deer and antelope. Upland game birds including the sage grouse find both cover and brood rearing/foraging benefits especially when found adjacent to sagebrush dominated states. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles as well as upland game birds. Many grassland obligate small mammals would occur here. Mixed Shrub/Short Grass Sod: These communities provide some foraging and cover for deer, antelope, and other large ungulates. This plant community, especially if proximal to other woody cover, may be used by sage grouse and other game birds for foraging and cover. Dense Shrub/Bare Ground: This plant community can provide important winter foraging and cover for mule deer and antelope during that time. This community provides excellent escape and thermal cover for large ungulates, as well as nesting habitat for sage grouse and other upland game birds. Alkali Sacaton/Saltcedar and/or Russian Olive: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. However, the plant community is less productive, and thus, less apt to meet the seasonal needs of these animals. The shrub cover does provide good thermal and escape cover for both large animals and upland birds. Russian olive may provide a good source of food for some upland game birds and large animals. Many grassland obligate small mammals would occur here. Dense Saltcedar and/or Russian Olive Stand/Annuals: This plant community can provide important winter cover for mule deer and antelope during that time and some foraging value if Russian olive trees are present. The plant community composition comprises little diversity, and thus, less apt to meet the seasonal needs of large grazers. The dense shrub cover does provide good thermal and escape cover for both large animals and upland birds. Russian olive may provide a good source of food for some upland game birds and large animals. 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 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 500-1200 .35 Inland Saltgrass/R. Wheatgrasses/Greasewood 450-1000 .30 Mixed Shrub/Short Grass Sod 350-800 .15 Dense Shrub/Bare Ground 300-600 .07 Alkali Sacaton/Saltcedar and/or Russian Olive 400-900 .25 Dense Saltcedar and/or Russian Olive Stand/Annuals 300-600 .07 * - 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 moderate to rapid. 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 hydrology information). Rills and gullies should not typically be present with the exception of relics, which should now be stabilized. 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 may be present. 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.

Contributors

Ray Gullion

Approval

Scott Woodall, 10/04/2019

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	05/01/2008
Approved by	
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.

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

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 20-40%.

5. Number of gullies and erosion associated with gullies: Active gullies typically present associated with ephemeral drainages associated with this site.

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

7. Amount of litter movement (describe size and distance expected to travel): Herbaceous litter expected to move only in small amounts.

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 2 (interspaces) to 5 (under plant canopy), but average values should be 3.5 or greater.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil data is limited for this site. Described A-horizons vary from 1 to 4 inches (3-10 cm). Organic matter is typically 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 45-75% grasses, 10% forbs, and 15-45% shrubs. Evenly distributed plant canopy (40-80%) and litter, and slow to moderate infiltration rates result in slight to moderate 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): No compaction layer exists, 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: tall, cool season bunchgrasses

Sub-dominant: perennial shrubscool season rhizomatous grasses

Other: mid & short-size, cool season bunchgrasses=perennial forbs

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.
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14. Average percent litter cover (%) and depth (in): Litter ranges from 10-25% of total canopy measurement with total litter (including beneath the plant canopy) from 25-50% expected. Herbaceous litter depth typically ranges from 3-10mm. Woody litter can be up to a couple inches (4-6 cm).
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15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):
English: 500-1200 lb/ac (850 lb/ac average); Metric: 560 -1344 kg/ha (952 kg/ha average).
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16. Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: Bare ground greater than 50% is the most common indicator of a threshold being crossed. Greasewood and inland saltgrass are common increasers. Perennial pepperweed, annual mustards, halogeton, kochia, and Russian thistle are common invasive species in disturbed sites.
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17. Perennial plant reproductive capability: All species are capable of reproducing, except in drought years.
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