USDA Natural Resources
Conservation Service

Ecological site R034AY216WY
Igneous Foothills and Basins West (Ig)

Accessed: 05/12/2025

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.

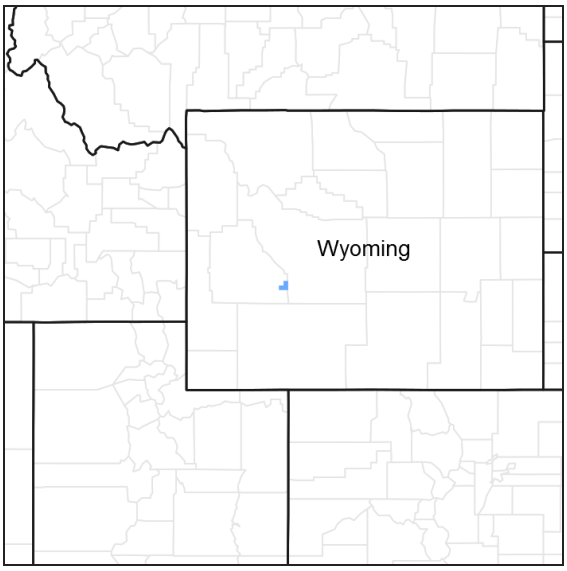


Figure 1. Mapped extent

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.

Associated sites

R034AY258WY	**Shallow Clayey Foothills and Basins West (SwCy)** Shallow Clayey
R034AY262WY	**Shallow Loamy Foothills and Basins West (SwLy)** Shallow Loamy

Similar sites

R043BY216WY	**Igneous Foothills and Mountains West** Igneous (Ig) 15-19W has higher production.
R034AY260WY	**Shallow Igneous Foothills and Basins West (SwIg)** Shallow Igneous (SwIg) 10-14W has higher production and bitterbrush as a major woody component.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site is usually found on steep slopes in upland positions. Although found on all exposures, it is most common on south and west facing slopes and ridge tops. Slopes are commonly 30 to 55%.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Escarpment (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–2,286 m
Slope	5–70%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 10-14 inches per year. 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. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool season plants begins about April 15 and continues to about August 15. Some green up of cool season plants usually occurs in September depending upon fall moisture occurrences.

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=wy website. Other climate stations representative of this precipitation zone include ”Border 3 N ” and Kemmerer Wtr Trtmt” in Lincoln County; “Evanston 1 E” in Uinta County; and “Merna” in Sublette County.

Table 3. Representative climatic features

Frost-free period (average)	67 days
Freeze-free period (average)	97 days
Precipitation total (average)	356 mm

Influencing water features

There are no water features associated with this site.

Soil features

The soils of this site are very shallow (less than 10”to bedrock), well-drained to somewhat excessively drained, and formed in residuum. They are usually found on mountain sides.

Table 4. Representative soil features

Surface texture	(1) Cobbly sandy loam (2) Stony loamy sand (3) Bouldery sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	10–25 cm
Surface fragment cover <=3"	10–25%
Surface fragment cover >3"	20–45%
Available water capacity (0-101.6cm)	0.64–1.27 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.2
Subsurface fragment volume <=3" (Depth not specified)	15–30%
Subsurface fragment volume >3" (Depth not specified)	30–45%

Ecological dynamics

As this site deteriorates, species such as big sagebrush and green rabbitbrush will increase. Cheatgrass may invade. Bluebunch wheatgrass and Indian ricegrass will decrease in frequency and production.

These plant communities narratives 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.

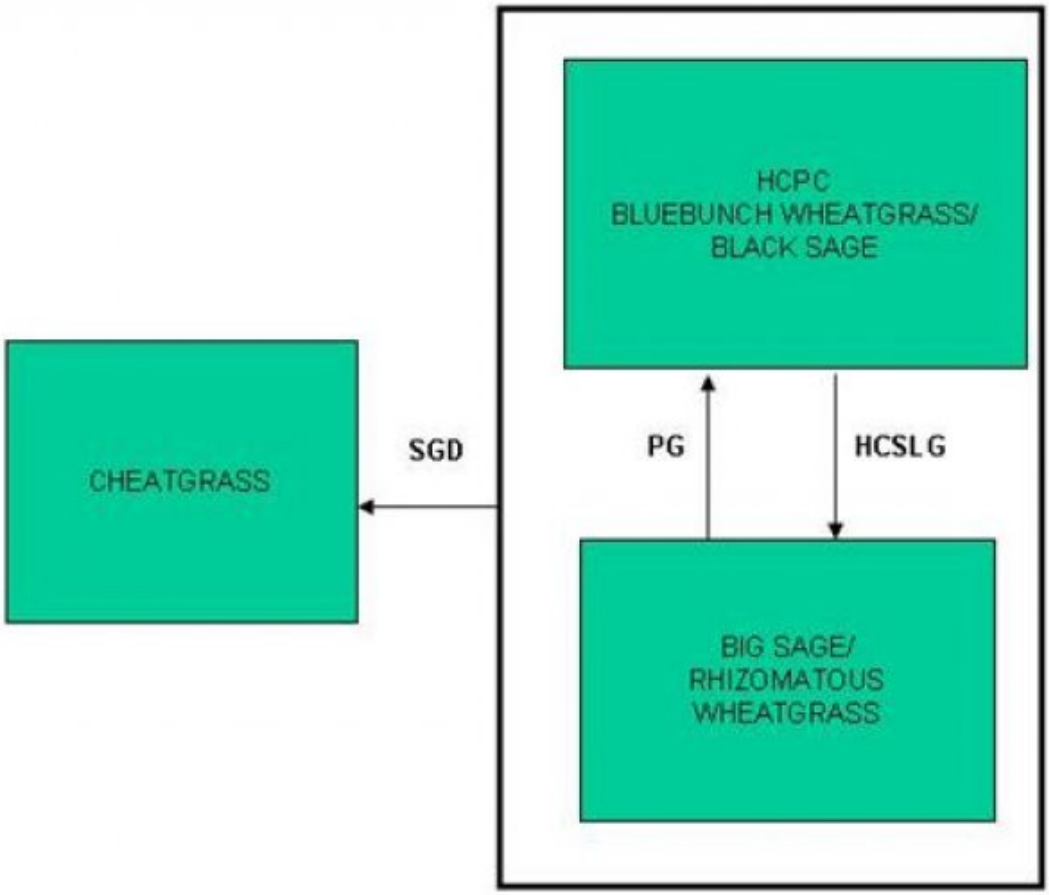
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical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

Site Type: Rangeland
MLRA: 34A-Cool Central Desertic Basins and Plateaus

Igneous (Ig) 10-14W
R034AY216WY



BMA – Brush Management (all methods)
BMC – Brush Management (chemical)
BMF – Brush Management (fire)
BMM – Brush Management (mechanical)
CSP – Chemical Seedbed Preparation
CSLG – Continuous Season-long Grazing
DR – Drainage
CSG – Continuous Spring Grazing
HB – Heavy Browse
HCSLG – Heavy Continuous Season-long Grazing
HI – Heavy Inundation
LPG – Long-term Prescribed Grazing
MT – Mechanical Treatment (chiseling, ripping, pitting)

NF – No Fire
NS – Natural Succession
NWC – Noxious Weed Control
NWI – Noxious Weed Invasion
NU – Nonuse
P&C – Plow & Crop (including hay)
PG – Prescribed Grazing
RPT – Re-plant Trees
RS – Re-seed
SGD – Severe Ground Disturbance
SHC – Severe Hoof Compaction
WD – Wildlife Damage (Beaver)
WF - Wildfire

State 1
Bluebunch Wheatgrass/Black Sagebrush (HCPC)

Community 1.1
Bluebunch Wheatgrass/Black Sagebrush (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 65% grasses or grass-like plants, 15% forbs, and 20% woody plants. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrass, Indian ricegrass, and bottlebrush squirreltail. Other grasses may include Canby, mutton, and Sandberg bluegrass, needleandthread, Letterman needlegrass, needleleaf sedge, and prairie junegrass. Black sagebrush is the dominant woody plant. Other woody plants may include bitterbrush, big sagebrush, green rabbitbrush, and snowberry. A typical plant composition for this state consists of bluebunch wheatgrass 20-35%, rhizomatous wheatgrass 1-10%, bottlebrush squirreltail 1-10%, Indian ricegrass 1-10%, other grasses and grass-like plants 5-15%, perennial forbs 5-15%, black sagebrush 5-10%, and 1-10% other woody species. Ground cover, by ocular estimate, varies from 20-30%. The total annual production (air-dry weight) of this state is about 400 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 550 lbs./acre in above average years. The state is stable and well adapted to the Cool Central Desertic Basins and Plateaus climatic conditions. The diversity in plant species allows 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: • Heavy Continuous Season-Long Grazing will convert this plant community to the Big Sagebrush/Rhizomatous Wheatgrass State. • Severe Ground Disturbance will convert this plant community to the Cheatgrass State.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	146	291	400
Shrub/Vine	45	90	123
Forb	34	67	93
Total	**225**	**448**	**616**

Figure 5. Plant community growth curve (percent production by month). WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

State 2
Big Sagebrush/Rhizomatous Wheatgrass

Community 2.1
Big Sagebrush/Rhizomatous Wheatgrass

This plant community is found under heavy, continuous season-long grazing. Black sagebrush and green rabbitbrush are significant components of this plant community. Dominant grasses in the understory include rhizomatous wheatgrass, bluegrasses, and Letterman needlegrass. Phlox and goldenweed are common forbs found on this site. The total annual production (air-dry weight) of this state is about 250 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 400 lbs./acre in above average years. Soil erosion is accelerated because of increased bare ground. The biotic community has been compromised, but is relatively stable. The watershed is functioning, but is at risk of further degradation. Water flow patterns and pedestals are obvious. Infiltration is reduced and runoff is increased. Transitional pathways leading to other plant communities are as follows: • Prescribed Grazing may over the long-term return this state to near Historic Climax Plant Community (Bluebunch Wheatgrass/Black Sagebrush State). • Severe Ground Disturbance will convert this plant community to the Cheatgrass State.

Figure 6. Plant community growth curve (percent production by month).

WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

State 3
Cheatgrass

Community 3.1
Cheatgrass

This vegetation state currently is a result of severe ground disturbance. Rabbitbrush flourishes and rhizomatous wheatgrass is the dominant understory grass. Other grasses include bluebunch wheatgrass and Letterman needlegrass. Cheatgrass invades, effectively increasing the fire frequency and limiting the ability for non-sprouting woody plants to reestablish. The total annual production (air-dry weight) of this state is about 150 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 200 lbs./acre in above average years. The state is vulnerable to excessive erosion. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant composition toward cheatgrass and annual forbs. The watershed is at risk as bare ground increases. Transitional pathways leading to other plant communities are as follows: It is not often practicable or economically feasible to convert this plant community at the present time.

Figure 7. Plant community growth curve (percent production by month).
WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				90–157	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	90–157	–
2				4–45	
	western wheatgrass	PASM	*Pascopyrum smithii*	4–45	–
3				4–45	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	4–45	–
4				4–45	
	squirreltail	ELEL5	*Elymus elymoides*	4–45	–
5				22–67	
	Grass, perennial	2GP	*Grass, perennial*	0–22	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–22	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–22	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–22	–
	needle and thread	HECO26	*Hesperostipa comata*	0–22	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–22	–
	muttongrass	POFE	*Poa fendleriana*	0–22	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–22	–
Forb					
6				22–67	

6				22–67	
	Forb, perennial	2FP	*Forb, perennial*	0–22	–
	common yarrow	ACMI2	*Achillea millefolium*	0–22	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0–22	–
	milkvetch	ASTRA	*Astragalus*	0–22	–
	castilla	CASTI	*Castilla*	0–22	–
	pale bastard toadflax	COUMP	*Comandra umbellata ssp. pallida*	0–22	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–22	–
	fleabane	ERIGE2	*Erigeron*	0–22	–
	buckwheat	ERIOG	*Eriogonum*	0–22	–
	aster	EUCEP2	*Eucephalus*	0–22	–
	granite prickly phlox	LIPU11	*Linanthus pungens*	0–22	–
	stoneseed	LITHO3	*Lithospermum*	0–22	–
	bluebells	MERTE	*Mertensia*	0–22	–
	nailwort	PARON	*Paronychia*	0–22	–
	beardtongue	PENST	*Penstemon*	0–22	–
	spiny phlox	PHHO	*Phlox hoodii*	0–22	–
	stonecrop	SEDUM	*Sedum*	0–22	–
	stemless mock goldenweed	STAC	*Stenotus acaulis*	0–22	–
	clover	TRIFO	*Trifolium*	0–22	–
	violet	VIOLA	*Viola*	0–22	–
Shrub/Vine					
8				22–45	
	black sagebrush	ARNO4	*Artemisia nova*	22–45	–
9				22–45	
	big sagebrush	ARTR2	*Artemisia tridentata*	0–22	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–22	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–22	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–22	–

Animal community

Animal Community – Wildlife Interpretations

Bluebunch Wheatgrass/Black Sagebrush Plant Community (HCPC): Suitable thermal and escape cover for most wildlife is limited due to the low height and density of woody plants. Bitterbrush and sagebrush provide important winter forage for mule deer and elk. Year-round habitat is provided for sage grouse and many other sagebrush obligate species such as the sage sparrow, Brewer’s sparrow, sage thrasher, pygmy rabbit, sagebrush vole, horned lizard, and pronghorn antelope.

Big Sagebrush/Rhizomatous Wheatgrass Plant Community: This plant community may be beneficial for the same wildlife 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 these animals.

Cheatgrass Plant Community: This plant community exhibits a low level of plant species diversity. In most cases it is not a desirable plant community to select as a wildlife habitat management objective.

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.

Plant Community Production (lb./ac) and Carrying Capacity* (AUM/ac)

Bluebunch Wheatgrass/Black Sagebrush (HCPC) 200-550 lb./ac and .12 AUM/ac

Big Sagebrush/Rhizomatous Wheatgrass 100-400 lb./ac and .07 AUM/ac

Cheatgrass 50-200 lb./ac and .03 AUM/ac

* - 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 highly variable and is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from slow to very rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, depth and degree of bedrock fracturing, slope, and ground cover (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

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

Recreational uses

This site provides hunting opportunities for upland game species.

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 clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Bill Christensen, Range Management Specialist, NRCS; Karen Clause, 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.

Contributors

Karen Clause

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	03/16/2007
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Some rills to be expected on this site. Depending on slope, rills range from .5-2 inches (1-5 cm) wide and are found every 3-6 feet (1-2 m).

2. **Presence of water flow patterns:** Some 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 30-60%.

5. **Number of gullies and erosion associated with gullies:** Gullies, where present, should be rare, re-vegetated, and U-shaped from the healing process.

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 in moderate amounts. Large woody debris will show only slight movement down slope.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 1 (interspaces) to 6 (under plant canopy), but average values should be 2.5 or greater.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Currently no soil series are correlated to this ecological site. Soil OM of less than 1% is expected.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 65-75% grasses, 15% forbs, and 10-20% shrubs. Sparse plant canopy (20-60%) and litter, steep slopes, plus moderate infiltration rates result in slight to moderate runoff. Basal cover is typically less than 5% and does very little to effect runoff on this site. Surface rock fragments of 10-50% provide stability to the site, but reduce infiltration.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer exists, but shallow depth to and exposed bedrock may be mistaken for a compaction layer.

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional: mid-size, cool season bunchgrasses>> perennial shrubs>perennial forbs>cool season rhizomatous grasses>short, cool season bunchgrasses

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal decadence, typically associated with shrub component.

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14. **Average percent litter cover (%) and depth (in):** Litter ranges from 5-25% of total canopy measurement with total litter (including beneath the plant canopy) from 15-50% expected. Herbaceous litter depth is typically shallow, ranging from 2-8 mm. Woody litter can be up to several inches (>8 cm).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 200-550 lb/ac (400 lb/ac average); Metric: 224-616 kg/ha (448 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: Rabbitbrush, Sandberg bluegrass, and phlox are common increasers. Annual weeds such as cheatgrass, mustards, 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.
