Ecological site R034AY158WY
Shallow Clayey Green River and Great Divide Basins (SwCy)

Last updated: 9/28/2023
Accessed: 05/18/2024

General information

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

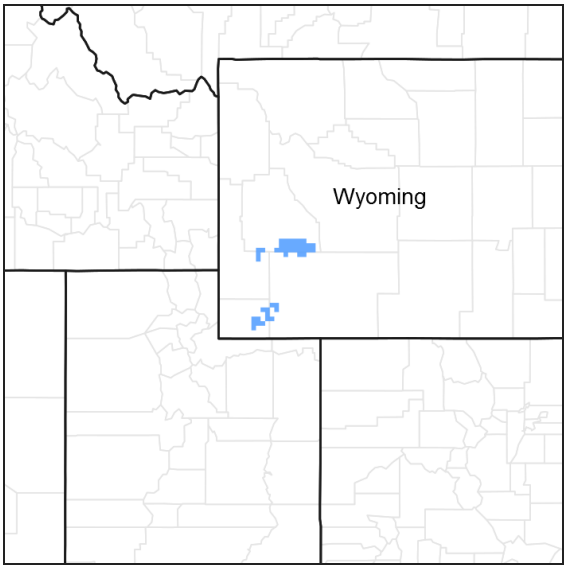


Figure 1. Mapped extent

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

Associated sites

R034AY104WY	**Clayey Green River and Great Divide Basins (Cy)** Clayey
R034AY122WY	**Loamy Green River and Great Divide Basins (Ly)** Loamy
R034AY162WY	**Shallow Loamy Green River and Great Divide Basins (SwLy)** Shallow Loamy

Similar sites

R034AY258WY	**Shallow Clayey Foothills and Basins West (SwCy)** Shallow Clayey (SwCy) 10-14W has higher production.
R034AY162WY	**Shallow Loamy Green River and Great Divide Basins (SwLy)** Shallow Loamy (SwLy) 7-9GR has a mixture of big sagebrush and alkali sagebrush.
R034AY104WY	**Clayey Green River and Great Divide Basins (Cy)** Clayey (Cy) 7-9GR has scattered big sagebrush instead of alkali sagebrush.
R034AY122WY	**Loamy Green River and Great Divide Basins (Ly)** Loamy (Ly) 7-9GR has big sagebrush instead of alkali sagebrush.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs in an upland position on south and west facing slopes, but can be found on all slopes and positions.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	1,829–2,195 m
Slope	0–60%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 7-9 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 July 15. Some green up of cool season plants may occur in September if moisture is available.

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 “Bitter Creek”, ”Farson ”, “Rock Springs FAA AP”, and “Wamsutter” in Sweetwater County; “Church Buttes Gas PLT”, and Mountain View” in Uinta County; “Fontenelle”, “La Barge”, and “Sage 4 NNW” in Lincoln County; and “Big Piney” in Sublette County.

Table 3. Representative climatic features

Frost-free period (average)	121 days
Freeze-free period (average)	132 days
Precipitation total (average)	229 mm

Influencing water features

There are no water features associated with this site.

Soil features

The soils of this site are shallow (8 to 15” to bedrock), well-drained loamy and fine soils weathered from sedimentary rock. These soils have slow to moderately slow permeability and may occur on all slopes. The bedrock is residuum which is virtually impenetrable to plant roots. This site may also include some deep gravelly and/or cobbly soils on south and west facing slopes which react like shallow soils. Usage of gravelly or cobbly surface/ subsurface texture modifiers may or may not be present.

Major Soil Series correlated to this site includes: Devoe, Roxal, and non-sodic phases of Youjay.

Other Soil Series in MLRA 34 correlated to this site include: Some clay loam phases of Haterton.

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to moderately slow
Soil depth	20–38 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	3.05–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	0–10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

As this site deteriorates, species such as alkali (early) sagebrush and unpalatable forbs will increase. Cool season bunchgrasses such as bluebunch wheatgrass and Indian ricegrass will decrease in frequency and production. This site has relatively low productivity potential, and is not well suited to grazing improvement practices unless treated as part of a larger unit containing more productive areas.

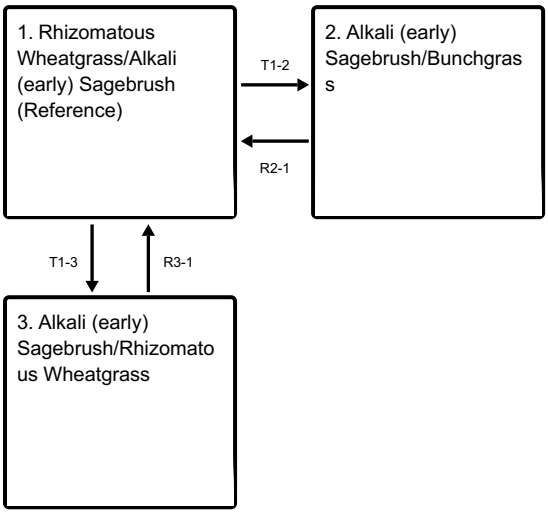
These plant communities narratives may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some 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 Reference 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.

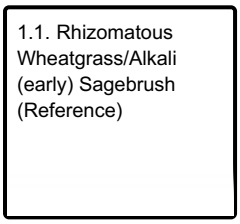
The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

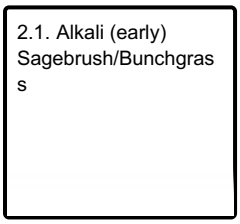
Ecosystem states



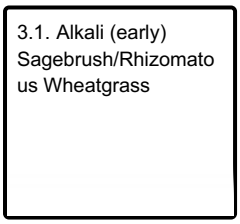
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Rhizomatous Wheatgrass/Alkali (early) Sagebrush (Reference)

Community 1.1
Rhizomatous Wheatgrass/Alkali (early) Sagebrush (Reference)

The interpretive plant community for this site is the Reference Plant Community. Potential vegetation is about 50%

grasses or grass-like plants, 10% forbs, and 40% woody plants. The major grasses include rhizomatous wheatgrass, bottlebrush squirreltail, Indian ricegrass, and bluebunch wheatgrass. Other grasses include Sandberg bluegrass, prairie junegrass, needleleaf sedge, and threeawn. Alkali (early) sagebrush and winterfat are the dominant woody plants. A typical plant composition for this state consists of rhizomatous wheatgrass 25-45%, bottlebrush squirreltail 10-20%, Indian ricegrass 5-15%, bluebunch wheatgrass 5-10%, other grasses and grass-like plants 5-10%, perennial forbs 5-10%, Alkali (early) sagebrush 5-20%, winterfat 1-10%, and 5-10% other woody species. Ground cover, by ocular estimate, varies from 35-45%. The total annual production (air-dry weight) of this state is about 350 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 450 lbs./acre in above average years. The state is extremely 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: • Nonuse will convert this plant community to the Alkali (early) Sagebrush/Bunchgrass State. • Continuous Season-long Grazing will convert the plant community to the Alkali (early) Sagebrush/Rhizomatous Wheatgrass State.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	112	196	252
Shrub/Vine	90	157	202
Forb	22	39	50
Total	**224**	**392**	**504**

Figure 5. Plant community growth curve (percent production by month). WY0401, 7-9GR, UPLAND SITES. ALL UPLAND SITES.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 2
Alkali (early) Sagebrush/Bunchgrass

Community 2.1
Alkali (early) Sagebrush/Bunchgrass

This plant community is the result of protection from grazing and fire. Alkali (early) sagebrush dominates this plant community with annual production often exceeding 30-40%. The understory of grass includes rhizomatous wheatgrass, bottlebrush squirreltail, Indian ricegrass, and bluebunch wheatgrass. The total annual production (air-dry weight) of this state is about 300 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 400 lbs./acre in above average years. The state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact, however forage value will decrease and wildlife values will shift toward different species. The watershed is functioning. Transitional pathways leading to other plant communities are as follows: • Prescribed Grazing will return this state to near Reference Plant Community (Rhizomatous Wheatgrass/Alkali (early) Sagebrush State).

Figure 6. Plant community growth curve (percent production by month). WY0401, 7-9GR, UPLAND SITES. ALL UPLAND SITES.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 3
Alkali (early) Sagebrush/Rhizomatous Wheatgrass

Community 3.1

Alkali (early) Sagebrush/Rhizomatous Wheatgrass

This plant community is the result of frequent and severe grazing. Alkali (early) sagebrush is a significant component of this plant community, often exceeding 35% of the annual production. Thickspike wheatgrass and unpalatable annual and perennial forbs dominate the herbaceous understory. Green rabbitbrush and bare ground have increased. The total annual production (air-dry weight) of this state is about 100 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 200 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 will result in a plant community very similar to the Reference Plant Community (Rhizomatous Wheatgrass/Alkali (early) Sagebrush State).

Figure 7. Plant community growth curve (percent production by month). WY0401, 7-9GR, UPLAND SITES. ALL UPLAND SITES.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

Transition T1-2
State 1 to 2

Nonuse will convert this plant community to the Alkali (early) Sagebrush/Bunchgrass State.

Transition T1-3
State 1 to 3

Continuous Season-long Grazing will convert the plant community to the Alkali (early) Sagebrush/Rhizomatous Wheatgrass State.

Restoration pathway R2-1
State 2 to 1

Prescribed Grazing will return this state to near Reference Plant Community (Rhizomatous Wheatgrass/Alkali (early) Sagebrush State).

Restoration pathway R3-1
State 3 to 1

Prescribed Grazing will result in a plant community very similar to the Reference Plant Community (Rhizomatous Wheatgrass/Alkali (early) Sagebrush State).

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				99–177	
	western wheatgrass	PASM	*Pascopyrum smithii*	99–177	–
2				39–78	
	squirreltail	ELEL5	*Elymus elymoides*	39–78	–
3				20–59	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	20–59	–
4				20–39	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	20–39	

	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	20–39	–
5				20–39	
	Grass, perennial	2GP	*Grass, perennial*	0–20	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–20	–
	threeawn	ARIST	*Aristida*	0–20	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–20	–
	needle and thread	HECO26	*Hesperostipa comata*	0–20	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–20	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–20	–
Forb					
6				20–39	
	Forb, perennial	2FP	*Forb, perennial*	0–20	–
	common yarrow	ACMI2	*Achillea millefolium*	0–20	–
	textile onion	ALTE	*Allium textile*	0–20	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0–20	–
	milkvetch	ASTRA	*Astragalus*	0–20	–
	fleabane	ERIGE2	*Erigeron*	0–20	–
	buckwheat	ERIOG	*Eriogonum*	0–20	–
	aster	EUCEP2	*Eucephalus*	0–20	–
	desertparsley	LOMAT	*Lomatium*	0–20	–
	tufted evening primrose	OECA10	*Oenothera caespitosa*	0–20	–
	phlox	PHLOX	*Phlox*	0–20	–
	dock	RUMEX	*Rumex*	0–20	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–20	–
Shrub/Vine					
7				20–78	
	little sagebrush	ARARL	*Artemisia arbuscula ssp. longiloba*	20–78	–
8				4–39	
	winterfat	KRLA2	*Krascheninnikovia lanata*	4–39	–
9				20–39	
	little sagebrush	ARAR8	*Artemisia arbuscula*	0–20	–
	birdfoot sagebrush	ARPE6	*Artemisia pedatifida*	0–20	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–20	–
	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–20	–
	green molly	BAAM4	*Bassia americana*	0–20	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–20	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	0–20	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–20	–

Animal community

Animal Community – Wildlife Interpretations

Rhizomatous Wheatgrass/Alkali (early) Sagebrush Plant Community (HCPC): Suitable thermal and escape cover

for most wildlife is limited due to the low height of woody plants. However, alkali (early) sagebrush and winterfat provide important winter forage for mule deer and antelope. When found proximal to taller sagebrush, these sites are suitable locations for sage grouse leks. 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. Other birds that would frequent this plant community horned larks and golden eagles.

Alkali (early) Sagebrush/Bunchgrass Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community.

Alkali (early) 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.

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)

Rhizomatous Wheatgrass/Alkali (early) Sagebrush (HCPC) 200-450 lb./ac and .11 AUM/ac

Alkali (early) Sagebrush/Bunchgrass 100-400 lb./ac and .09 AUM/ac

Alkali (early) Sagebrush/Rhizomatous Wheatgrass 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 dominated by soils in hydrologic group D. Infiltration is low when soils are wet due to shallow depth to bedrock and/or impervious subsurface layer. Runoff potential for this site varies from high to moderate depending on soil depth, bedrock type (impervious vs. permeable) and ground cover (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. Cryptogrammic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. Wildflowers that bloom in spring have esthetic values that appeal 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 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

Approval

Kirt Walstad, 9/28/2023

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	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rare to nonexistent. Where present, short and widely spaced.

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2. **Presence of water flow patterns:** Barely observable.

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3. **Number and height of erosional pedestals or terracettes:** Slight pedestalling evident on this site.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 40-70%.

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move only in small amounts (to leeward side of shrubs) due to wind. Woody debris will show no movement.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 2 (interspaces) to 6 (under plant canopy), but average values should be 3.0 or greater.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Currently no soil series are correlated to this ecological site. Soil OM of less than .5% 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 50-80% grasses, 10% forbs, and 10-40% shrubs. A sparse plant canopy (30-50%) and litter plus slow infiltration rates result in slight runoff. Basal cover is typically less than 5% and does very little to effect runoff on this site.

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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):** A change in soil structure at the Bt-horizon acts as a natural compaction layer restricting root growth.

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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: cool season rhizomatous grasses>perennial shrubs>mid-size, cool season bunchgrasses>perennial forbs>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):** Some decadence expected, typically associated with shrub component.

14. **Average percent litter cover (%) and depth (in):** Litter ranges from 5-20% of total canopy measurement with total litter (including beneath the plant canopy) from 10-30% expected. Herbaceous litter depth is typically very shallow, ranging from 1-5mm. 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: 200-450 lb/ac (350 lb/ac average); Metric: 224-504 kg/ha (392 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 80% is the most common indicator of a threshold being crossed. Green rabbitbrush, Sandberg bluegrass, and phlox are common increasers. Annual weeds such as halogeton, kochia, 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.