USDA Natural Resources
Conservation Service

Ecological site R034AY246WY
Sands Foothills and Basins West (Sa)

Accessed: 05/14/2025

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.

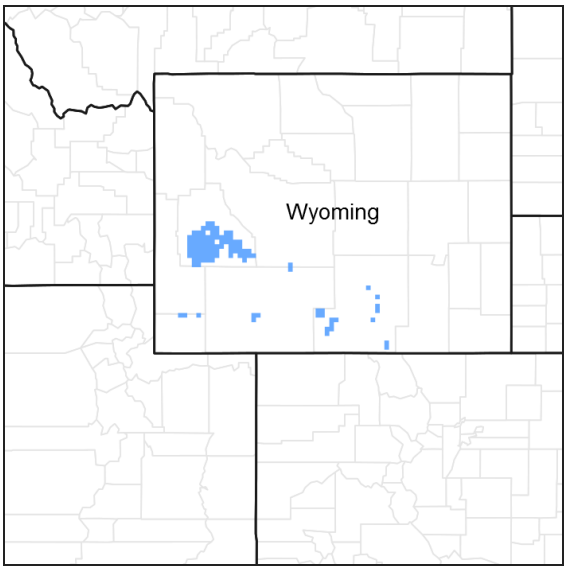


Figure 1. Mapped extent

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

R034AY250WY	**Sandy Foothills and Basins West (Sy)** Sandy

Similar sites

R034AY146WY	**Sands Green River and Great Divide Basins (Sa)** Sands 7-9GR has lower production.
R034AY250WY	**Sandy Foothills and Basins West (Sy)** Sandy 10-14W has lower production and shorter shrub height.

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 rolling to very rough topography. Slopes are commonly 10 to 30%,

and elevations are mostly above 7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–2,286 m
Slope	5–60%
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 formed primarily in aeolian deposits and less commonly in residuum. They are deep and moderately deep sandy soils. This soil can develop into active sand dunes with the deterioration of cover. The parent material is eolian sands, outwash, and residuum.

Major soil series correlated to this site include: Coyet, Zeomont and a moist phase of the Bodorumpe series.

Table 4. Representative soil features

Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	3.05–6.35 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

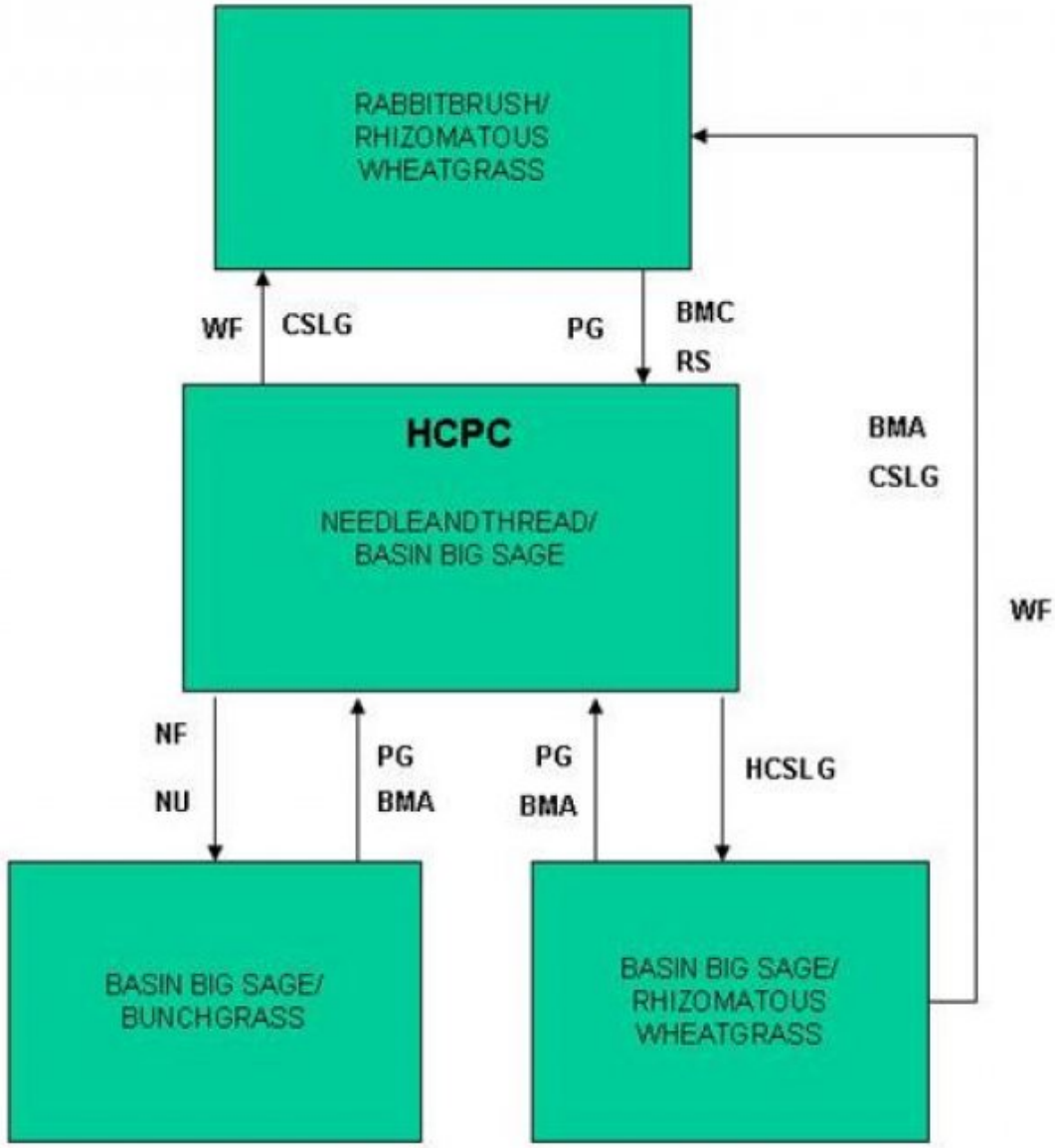
As this site deteriorates from improper grazing management, woody species such as basin big sagebrush and rabbitbrush will increase. Bunchgrasses such as Indian ricegrass and needleandthread will decrease in frequency and production.

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



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
Needleandthread/Basin Big Sagebrush (HCPC)

Community 1.1
Needleandthread/Basin Big Sagebrush (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and is suited for grazing by domestic livestock. Potential vegetation is estimated at 60% grasses or grass-like plants, 15% forbs, and 25% woody plants. The major grasses include needleandthread, Indian ricegrass, thickspike wheatgrass, and bottlebrush squirreltail. Other grasses include Sandberg bluegrass, prairie junegrass, bluebunch wheatgrass, Canby bluegrass, and needleleaf sedge. Basin big sagebrush is the dominant woody plant. Other woody plants may include bitterbrush, fourwing saltbush, rubber and green rabbitbrush, winterfat, and silver sagebrush. A typical plant composition for this state consists of needleandthread 15-35%, Indian ricegrass 10-25%, thickspike wheatgrass 5-10%, bottlebrush squirreltail 5-10%, other grasses and grass-like plants 10-20%, perennial forbs 5-15%, basin big sagebrush 5-10%, and 5-15% other woody species. Ground cover, by ocular estimate, varies from 20-30%. The total annual production (air-dry weight) of this state is about 1400 pounds per acre, but it can range from about 900 lbs./acre in unfavorable years to about 1700 lbs./acre in above average years. This plant community 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 tolerance. 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 and No Fire will convert this plant community to the Basin Big Sagebrush/Bunchgrass State. • Heavy Continuous Season-Long Grazing will convert this plant community to the Basin Big Sagebrush/Rhizomatous Wheatgrass State. • Wildfire followed by Continuous Season-long Grazing will convert this plant community to the Rabbitbrush/Rhizomatous Wheatgrass State.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	605	942	1143
Shrub/Vine	252	392	476
Forb	151	235	286
Total	**1008**	**1569**	**1905**

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
Basin Big Sagebrush/Bunchgrass

Community 2.1
Basin Big Sagebrush/Bunchgrass

This plant community is the result of nonuse and the absence of fire. Shrubs dominate the site, lowering herbaceous forage production. Basin big sagebrush often exceeds 15% of the annual production. Bunchgrasses such as needleandthread and Indian ricegrass dominate the understory. The total annual production (air-dry weight) of this state is about 1000 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1300 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: • Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this state to near Historic Climax Plant Community (Needleandthread/Basin Big Sagebrush State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges.

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
Basin Big Sagebrush/Rhizomatous Wheatgrass

Community 3.1
Basin Big Sagebrush/Rhizomatous Wheatgrass

This plant community is the result of continuous season-long grazing. It is dominated by shrubs, bare ground, thickspike wheatgrass, bluegrasses, and both annual and perennial forbs. Common forbs include scurfpea and sagebrush gilia. Basin big sage often approaches 45% of annual production. The total annual production (air-dry weight) of this state is about 700 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 1000 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: • Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this state to near Historic Climax Plant Community (Needleandthread/Basin Big Sagebrush State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges. • Wildfire OR Brush Management followed by Continuous Season-long Grazing will convert this plant community to the Rabbitbrush/Rhizomatous Wheatgrass State.

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			

State 4
Rabbitbrush/Rhizomatous Wheatgrass

Community 4.1
Rabbitbrush/Rhizomatous Wheatgrass

This plant community is the result of severe disturbance such as brush management or wildfire followed by improper grazing. It is dominated by sprouting shrubs such as rabbitbrush. Rhizomatous grasses such as thickspike wheatgrass, and unpalatable annual and perennial forbs are in the understory. There is a substantial amount of bare ground. The total annual production (air-dry weight) of this state is about 400 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 700 lbs./acre in above average years. The soil is not protected and erosion will increase if management is not changed. The biotic integrity may be reduced due to low vegetative production and blowing sand. The watershed is functioning at risk. Transitional pathways leading to other plant communities are as follows: • Brush Management (chemical) and Re-seeding followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this plant community to near Historic Climax Plant Community (Needleandthread/Basin Big Sagebrush State). Additional deferment may be necessary and should be prescribed on an individual site basis.

Figure 8. 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				235–549	
	needle and thread	HECO26	*Hesperostipa comata*	235–549	–
	needle and thread	HECO26	*Hesperostipa comata*	235–549	–
2				157–392	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	157–392	–
3				78–157	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	78–157	–
4				78–157	
	squirreltail	ELEL5	*Elymus elymoides*	78–157	–
5				157–314	
	Grass, perennial	2GP	*Grass, perennial*	0–78	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–78	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–78	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–78	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–78	–
Forb					
6				78–235	
	Forb, perennial	2FP	*Forb, perennial*	0–78	–
	common yarrow	ACMI2	*Achillea millefolium*	0–78	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0–78	–
	sandwort	ARENA	*Arenaria*	0–78	–
	milkvetch	ASTRA	*Astragalus*	0–78	–
	bastard toadflax	COUM	*Comandra umbellata*	0–78	–
	fleabane	ERIGE2	*Erigeron*	0–78	–
	buckwheat	ERIOG	*Eriogonum*	0–78	–
	aster	EUCEP2	*Eucephalus*	0–78	–
	granite prickly phlox	LIPU11	*Linanthus pungens*	0–78	–
	desertparsley	LOMAT	*Lomatium*	0–78	–
	bluebells	MERTE	*Mertensia*	0–78	–
	beardtongue	PENST	*Penstemon*	0–78	–
	phacelia	PHACE	*Phacelia*	0–78	–
	buttercup	RANUN	*Ranunculus*	0–78	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–78	–
	clover	TRIFO	*Trifolium*	0–78	–
	deathcamas	ZIGAD	*Zigadenus*	0–78	–
Shrub/Vine					
7				78–157	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	78–157	–
8				78–235	

	silver sagebrush	ARCAC5	*Artemisia cana ssp. cana*	0–78	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–78	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–78	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–78	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–78	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–78	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–78	–

Animal community

Animal Community – Wildlife Interpretations

Needleandthread/Basin Big Sagebrush Plant Community: This plant community provides suitable thermal and escape cover for mule deer and elk. Sagebrush, which can approach 15% protein and 40-60% digestibility, provides important winter forage for mule deer and antelope. 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 include horned larks and golden eagles.

Basin Big Sagebrush/Bunchgrass Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community.

Basin Big Sagebrush/Rhizomatous Wheatgrass Plant Community: These communities are unstable due to moving sand dunes. They provide a unique temporary habitat for some small mammals and birds.

Rabbitbrush/Rhizomatous Wheatgrass Plant Community: These communities are unstable due to moving sand dunes. They provide a unique temporary habitat for some small mammals and birds.

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)

Needleandthread/Basin Big Sagebrush (HCPC) 900-1700 lb./ac and .45 AUM/ac

Basin Big Sagebrush/Bunchgrass 500-1300 lb./ac and .3 AUM/ac

Basin Big Sagebrush/Rhizomatous Wheatgrass 200-1000 lb./ac and .2 AUM/ac

Rabbitbrush/ Rhizomatous Wheatgrass 100-700 lb./ac and .1 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 A, with localized areas in hydrologic group B. Infiltration potential for this site varies from moderately rapid to very rapid depending on soil hydrologic group and ground cover. Runoff varies from very low to moderately low (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. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors. The sandy nature of the soils appeals to Off-Road Vehicle (ORV) users.

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:** Rare to nonexistent.

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

3. **Number and height of erosional pedestals or terracettes:** Rare to nonexistent.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 20-50%.

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:** Wind scouring and deposition evident and associated with dune topography typical of this site.

7. **Amount of litter movement (describe size and distance expected to travel):** Herbaceous litter expected to move due to wind. Large woody debris from sagebrush will show no movement.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil Stability Index ratings range from 1 (interspaces) to 5 (under plant canopy), but average values should be 2.5 or greater.

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.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 60-75% grasses, 15% forbs, and 10-25% shrubs. Evenly distributed plant canopy (40-60%) and litter plus rapid infiltration rates result in minimal runoff. Basal cover is typically less than 5% for this site and does very little to effect runoff on this site.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

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

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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 10-25% of total canopy measurement with total litter (including beneath the plant canopy) from 20-50% expected. Herbaceous litter depth typically rangew 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: 900-1700 lb/ac (1400 lb/ac average); Metric 1008-1904 kg/ha (1568 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 60% is the most common indicator of a threshold being crossed. Rabbitbrush, basin big sagebrush, rhizomatous wheatgrasses, and sage gilia are common increasers.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing, except in drought years.
