USDA Natural Resources
Conservation Service

Ecological site R024XY019OR
SILT LOAM TERRACE 8-11 PZ

Last updated: 3/07/2025
Accessed: 05/20/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 024X–Humboldt Basin and Range Area

Major land resource area (MLRA) 24, the Humboldt Area, covers an area of approximately 8,115,200 acres (12,680 sq. mi.). It is found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Elevations range from 3,950 to 5,900 feet (1,205 to 1,800 meters) in most of the area, some mountain peaks are more than 8,850 feet (2,700 meters).
A series of widely spaced north-south trending mountain ranges are separated by broad valleys filled with alluvium washed in from adjacent mountain ranges. Most valleys are drained by tributaries to the Humboldt River. However, playas occur in lower elevation valleys with closed drainage systems. Isolated ranges are dissected, uplifted fault-block mountains. Geology is comprised of Mesozoic and Paleozoic volcanic rock and marine and continental sediments. Occasional young andesite and basalt flows (6 to 17 million years old) occur at the margins of the mountains. Dominant soil orders include Aridisols, Entisols, Inceptisols and Mollisols. Soils of the area are generally characterized by a mesic soil temperature regime, an aridic soil moisture regime and mixed geology. They are generally well drained, loamy and very deep.

Approximately 75 percent of MLRA 24 is federally owned, the remainder is primarily used for farming, ranching and mining. Irrigated land makes up about 3 percent of the area; the majority of irrigation water is from surface water sources, such as the Humboldt River and Rye Patch Reservoir. Annual precipitation ranges from 6 to 12 inches (15 to 30 cm) for most of the area, but can be as much as 40 inches (101 cm) in the mountain ranges. The majority of annual precipitation occurs as snow in the winter. Rainfall occurs as high-intensity, convective thunderstorms in the spring and fall.

Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascends the western slopes of the Sierra Range, the air cools, condensation takes place and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the west but throughout the State, with the result that the lowlands of Nevada are largely desert or steppes.

Ecological site concept

Silt Loam Terrace 8-11 PZ site is on the outer terraces of lake basins and valley floors. Slopes are less than 5 percent. The soil is very deep and well drained. The typical vegetation is a mix of Wyoming big sagebrush, bluebunch wheatgrass, and basin wildrye.

This site was transferred to MLRA 24 from MLRA 23 with utilization of the same 3-digit site number. It occurs on the north edge of MLRA 23, bordering MLRA 10. Further field work is required to determine if this site should remain in MLRA 24.

Associated sites

R023XY200OR	**PONDED CLAY** Ponded Clay (lower depression or swale position, spring ponding or flooding, somewhat poorly drained, different composition - silver sagebrush (ARCA13)/wood bluegrass (PONE) dominant)
R024XY004OR	**DRY FLOODPLAIN 6-10 PZ** Dry Floodplain (increase in available surface and subsurface moisture, higher production, different composition – basin wildrye (LECI4) dominant grass)
R024XY008OR	**CLAYEY PLAYETTE** Clayey Playette (thin vesicular crust over clayey subsoil, lower production, different composition - squirreltail (ELEL5) dominant grass)
R024XY016OR	**LOAMY 8-10 PZ** Loamy 8-10 PZ (upland site, shallower soil depth, lower production, different composition – Thurber's needlegrass (ACTH7)-bluebunch wheatgrass (PSSPS)-Indian ricegrass (ACHY) dominant grasses)
R024XY123OR	**LOW CLAYEY TERRACE 8-10 PZ** Low Clayey Terrace 8-10 PZ (thin surface horizon over clay subsoil, lower production. different composition – bluebunch wheatgrass (PSSPS) dominant)
R024XY124OR	**CLAYEY TERRACE 8-10 PZ** Clayey Terrace 8-10 PZ (fine textured, lower production, different composition – bluebunch wheatgrass (PSSPS) strongly dominant)

Similar sites

R024XY008OR	**CLAYEY PLAYETTE** Clayey Playette (thin vesicular crust over clayey subsoil, lower production, different composition - squirreltail (ELEL5) dominant grass)
R024XY124OR	**CLAYEY TERRACE 8-10 PZ** Clayey Terrace 8-10 PZ (fine textured, lower production, different composition – bluebunch wheatgrass (PSSPS) strongly dominant)
R024XY123OR	**LOW CLAYEY TERRACE 8-10 PZ** Low Clayey Terrace 8-10 PZ (thin surface horizon over clay subsoil, lower production. different composition – bluebunch wheatgrass (PSSPS) dominant)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. wyomingensis*
Herbaceous	(1) *Pseudoroegneria spicata subsp. spicata* (2) *Leymus cinereus*

Physiographic features

This site is on outer terraces of lake basins and valley floors. Typically, the site is a relatively low terrace next to basin toe slopes. Slopes range from 2 to 5 percent and elevations from 4000 to 4600 feet (1219 to 1402 m).

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Hillslope (3) Stream terrace
Runoff class	Medium to very high
Elevation	4,000–4,600 ft
Slope	2–5%
Water table depth	20–39 in
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 8 to 11 inches (20 to 28 cm), most of which occurs in the form of snow and rain during the months of December through March. Localized convection storms occasionally occur during the summer. The soil temperature is mesic to frigid near mesic with a mean air temperature of 47 degrees F. Temperature extremes

range from 100 to -10 degrees F. The frost-free period ranges from 90 to 120 days. The optimum period for plant growth is from April through early June.

Table 3. Representative climatic features

Frost-free period (characteristic range)	37 days
Freeze-free period (characteristic range)	77 days
Precipitation total (characteristic range)	11 in
Frost-free period (actual range)	37 days
Freeze-free period (actual range)	77 days
Precipitation total (actual range)	11 in
Frost-free period (average)	37 days
Freeze-free period (average)	77 days
Precipitation total (average)	11 in

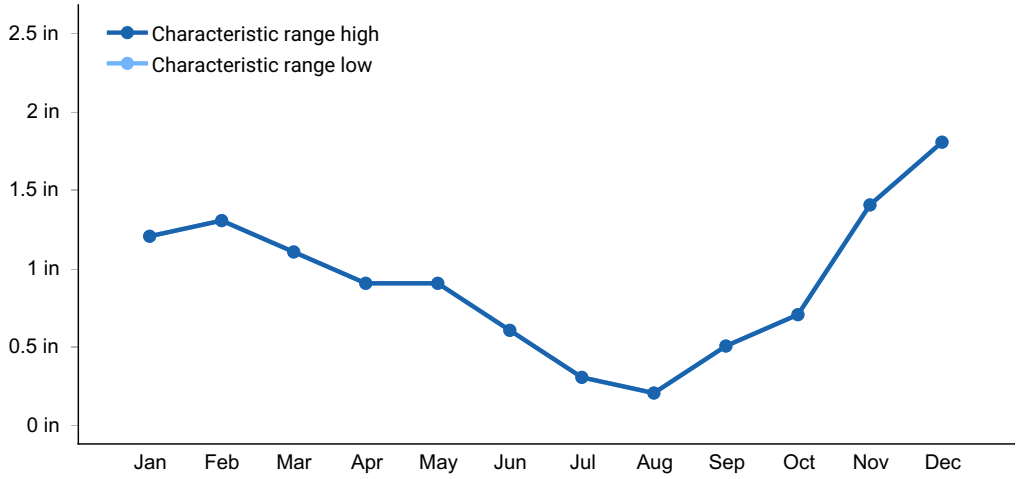


Figure 1. Monthly precipitation range

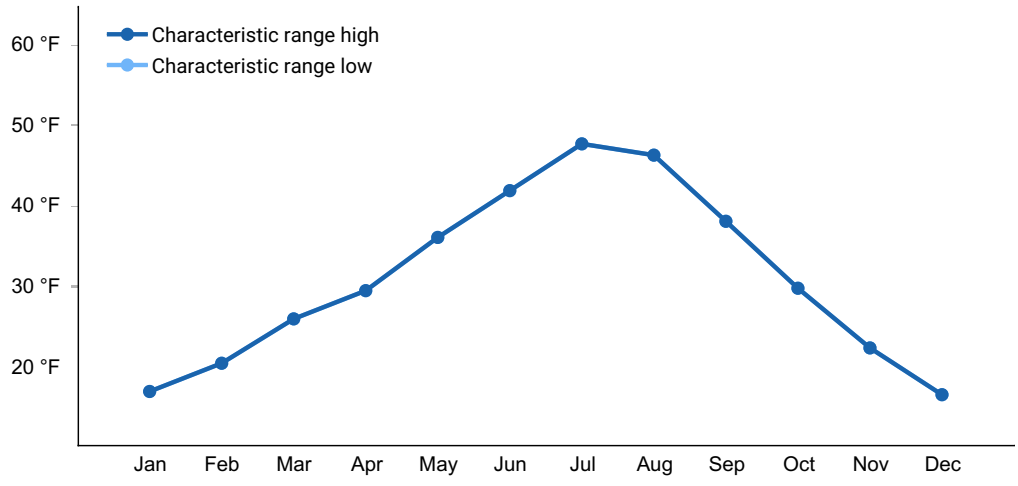


Figure 2. Monthly minimum temperature range

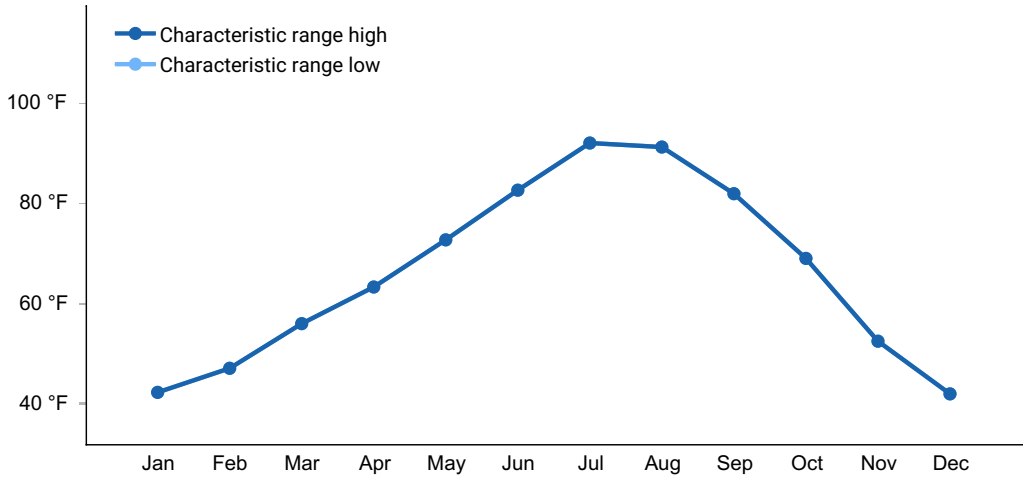


Figure 3. Monthly maximum temperature range

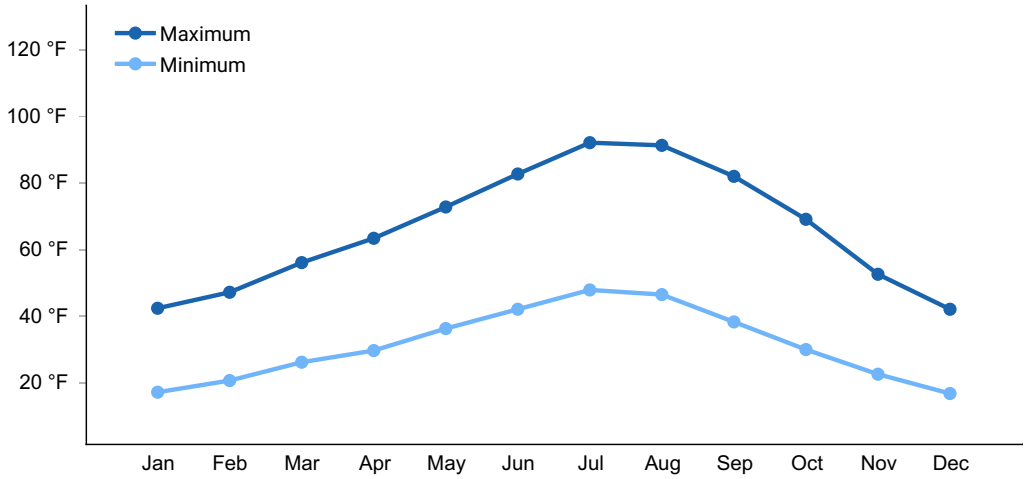


Figure 4. Monthly average minimum and maximum temperature

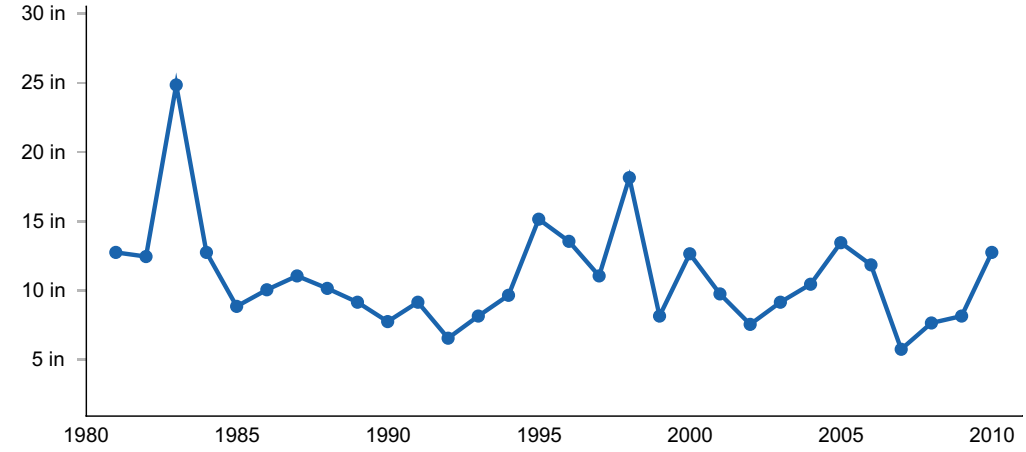


Figure 5. Annual precipitation pattern

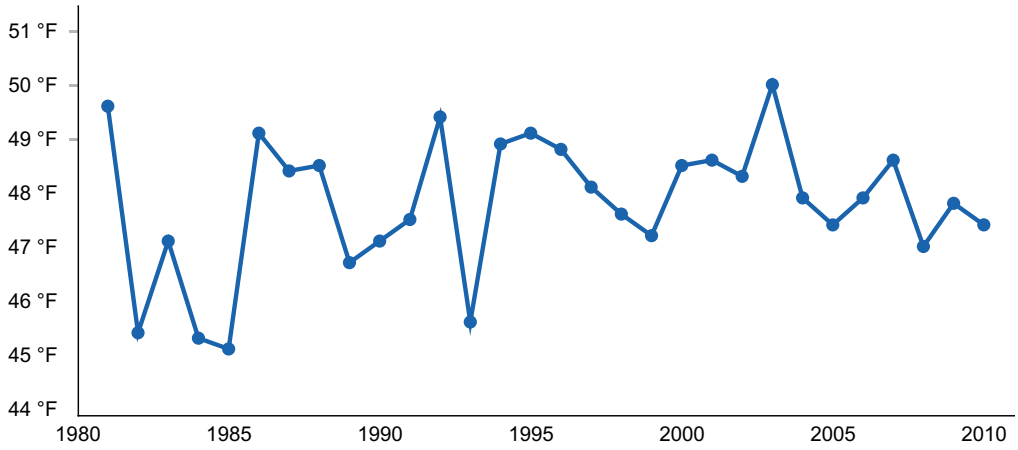


Figure 6. Annual average temperature pattern

Climate stations used

- (1) PARADISE VALLEY 1 NW [USC00266005], Paradise Valley, NV

Influencing water features

Site is not influenced by water features.

Soil features

The soils are medium textured, very deep, and well drained. The surface layer is typically a silt loam 7 inches (18cm) thick over a silty clay loam to loam subsoil. Permeability is moderately slow. The available water holding capacity (AWC) is 8 to 10 inches (20 to 25 cm). Depth to a water table is normally greater than 60 inches (152cm). The potential for wind and water erosion is slight.

The associated soils are Genaw, Lerrow, Windybutte, Hunewill, and Morfitt.

Table 4. Representative soil features

Parent material	(1) Volcanic ash–rhyolite (2) Loess (3) Alluvium
Surface texture	(1) Silt loam (2) Gravelly, ashy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	20 in
Surface fragment cover <=3"	0–15%

Surface fragment cover >3"	0%
Available water capacity (0-40in)	8–10 in
Soil reaction (1:1 water) (0-72in)	7–8.2
Subsurface fragment volume <=3" (0-72in)	0–15%
Subsurface fragment volume >3" (0-72in)	0–15%

Ecological dynamics

The reference native plant community is dominated by bluebunch wheatgrass along with Wyoming and basin big sagebrush. Basin wildrye is prominent. Thurber's needlegrass, Sandberg bluegrass, prairie junegrass and a variety of forbs are present. The potential vegetative composition is approximately 75 percent grass, 15 percent shrubs and 10 percent forbs. The approximate ground cover is 50 to 60 percent (basal and crown).

Four states have been identified for this site: a reference state; a state with the presence of annuals; a state with a shrub/annual co-dominance; and a state with annual dominance.

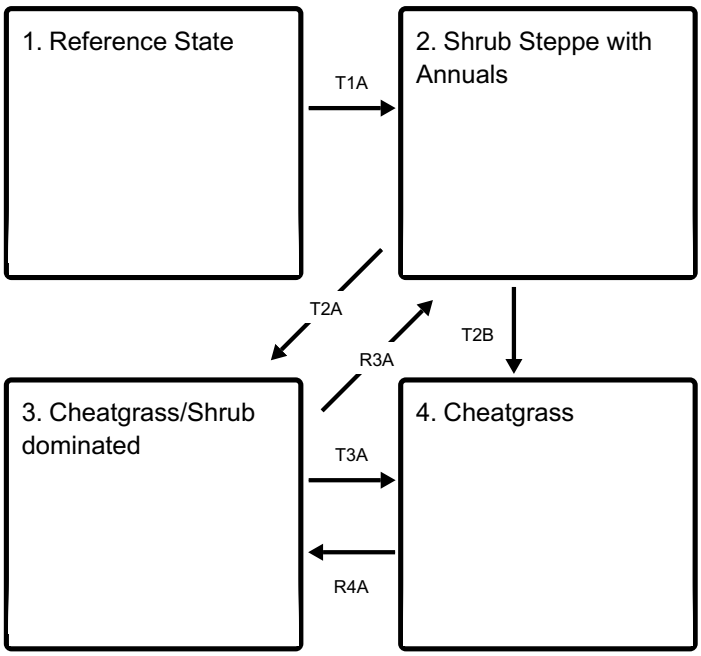
Range in Characteristics-
Production will increases at the upper end of the precipitation zone. Bluebunch wheatgrass increases on a silty to silty clay loam surface. Basin wildrye increases with increasing available subsurface moisture and in the proximity of swales and drainages. Thurber's needlegrass and Indian ricegrass increase on coarser surfaces and on droughty sites.

Response to Disturbance - States
If heavy grazing causes site deterioration, bluebunch wheatgrass and basin wildrye decrease. Wyoming and basin big sagebrush, bottlebrush squirreltail and Sandberg bluegrass increase. Annuals invade. With further deterioration perennials decrease and the extent of bare areas increase. With fire under deteriorated conditions annuals can strongly invade.

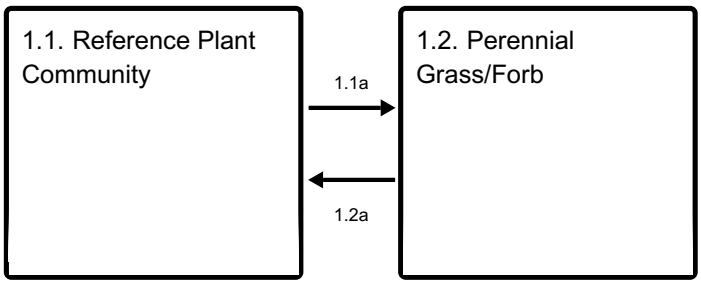
States: ARTRW8(T)/ELEL5-POSE – bare ground; ARTRW8/Annuals – bare areas; Annuals-bare ground with fire under deteriorated conditions

State and transition model

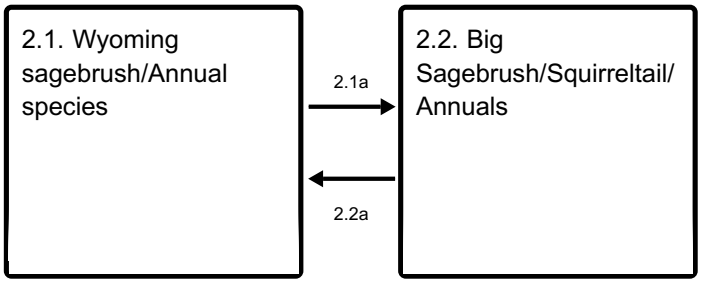
Ecosystem states



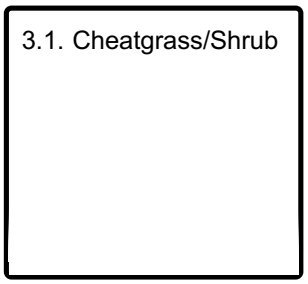
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities

4.1. Cheatgrass

State 1
Reference State

Plant community phase change is driven by infrequent fire. Wyoming and basin big sagebrush decline after fire while Thurber's needlegrass, Indian ricegrass and other grasses increase. May see a temporary increase in rabbitbrush after fire. Time facilitates the reintroduction of sagebrush.

Community 1.1
Reference Plant Community

The reference native plant community is dominated by bluebunch wheatgrass along with Wyoming and basin big sagebrush. Basin wildrye is prominent. Thurber's needlegrass, Sandberg bluegrass, prairie junegrass and a variety of forbs are present. The potential vegetative composition is approximately 75 percent grass, 15 percent shrubs and 10 percent forbs. The approximate ground cover is 50 to 60 percent (basal and crown).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	600	750	900
Shrub/Vine	120	150	180
Forb	80	100	120
Total	**800**	**1000**	**1200**

Community 1.2
Perennial Grass/Forb

Perennial grasses and forbs dominate the plant community.

Pathway 1.1a
Community 1.1 to 1.2

Fire reduces shrub canopy cover.

Pathway 1.2a
Community 1.2 to 1.1

Lack of disturbance allows shrubs to establish in the community.

State 2
Shrub Steppe with Annuals

Compositionally similar to the reference state with a trace of cheatgrass and weedy forbs. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Prescribed grazing and infrequent fire (> 50 year return interval) maintain state dynamics. Overgrazing or prolonged drought (CP1) favors Wyoming and basin big sagebrush, squirreltail and Sandberg's bluegrass. Prescribed grazing and/or release from drought may reverse the decline in needlegrass and Indian ricegrass production. Infrequent fire reduces the shrub community and promotes the bunchgrass component (CP2).

Community 2.1
Wyoming sagebrush/Annual species

Site is dominated by Wyoming sagebrush with an understory dominated by annual grasses.

Community 2.2
Big Sagebrush/Squirreltail/Annuals

Plant community is dominated by big sagebrush, squirreltail, and annual grasses.

Pathway 2.1a
Community 2.1 to 2.2

Drought and grazing pressure.

Pathway 2.2a
Community 2.2 to 2.1

Release from drought.

State 3
Cheatgrass/Shrub dominated

Wyoming and basin big sagebrush is decadent with little recruitment. The perennial grass component is significantly reduced in both density and productivity. Cheatgrass and/or annual forbs and/or Sandberg's bluegrass along with sagebrush control site resources

and drive ecological dynamics. Bare ground is abundant. Spatial and temporal energy capture and nutrient cycling has been truncated. Infiltration may be reduced due to lack of ground cover. Risk of soil erosion by both wind and water is increased.

Community 3.1
Cheatgrass/Shrub

Site is dominated by cheatgrass or other annual grasses with a canopy of shrubs.

State 4
Cheatgrass

Cheatgrass and/or annual weed dominated plant community with limited to no shrub or perennial grass component. Soil erosion and redistribution along with changes in dynamic soil properties affect the hydrologic cycle and thus the nutrient cycle. Harsh environmental factors increase state resiliency to change.

Community 4.1
Cheatgrass

Site is entirely dominated by non-native plants, generally cheatgrass.

Transition T1A
State 1 to 2

Introduction of annual weeds.

Transition T2A
State 2 to 3

Abusive grazing and/or prolonged drought leads to a biotic threshold characterized by decadent Wyoming and basin big sagebrush with an understory dominated by cheatgrass and/or weedy forbs and/or Sandberg’s bluegrass. Trace amounts of the original community remain. Rabbitbrush may increase.

Transition T2B
State 2 to 4

Fire leading to an abiotic threshold.

Restoration pathway R3A
State 3 to 2

Rehabilitation involves mechanical or herbicide control of sagebrush. Herbicide treatment

of weedy species may be required. If Sandberg’s bluegrass dominates, a mechanical or herbicide treatment may be necessary to facilitate desired seedling establishment. Seeding may be necessary.

Transition T3A
State 3 to 4

Catastrophic wildfire leading to an abiotic threshold.

Restoration pathway R4A
State 4 to 3

Drill seeding with drought tolerant species. Herbicide may be an option. If seeding is successful follow with prescribed grazing to reduce cheatgrass and decrease fuel loading. Low probability of seeding success.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Dominant, moderate rooted bunchgrass**			300–500	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	300–500	–
2	**Sub-dominant, deep-rooted bunchgrass**			100–200	
	basin wildrye	LECI4	*Leymus cinereus*	100–200	–
3	**Perennial, moderate rooted bunchgrasses**			70–150	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	50–100	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	20–50	–
5	**Other perennial grasses**			40–120	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	5–50	–
	squirreltail	ELEL5	*Elymus elymoides*	10–30	–
	beardless wildrye	LETR5	*Leymus triticoides*	5–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	10–30	–
	Webber needlegrass	ACWE3	*Achnatherum webberi*	0–20	–
	foxtail wheatgrass	PSSA2	×*Pseudelymus saxicola*	5–10	–

Forb					
6	**Perennial forbs**			20–100	
	buckwheat	ERIOG	*Eriogonum*	5–20	–
	stoneseed	LITHO3	*Lithospermum*	5–15	–
	desertparsley	LOMAT	*Lomatium*	5–15	–
	lupine	LUPIN	*Lupinus*	5–15	–
	milkvetch	ASTRA	*Astragalus*	5–15	–
	hawksbeard	CREPI	*Crepis*	5–10	–
	erigenia	ERIGE	*Erigenia*	5–10	–
	common yarrow	ACMI2	*Achillea millefolium*	3–10	–
	phlox	PHLOX	*Phlox*	5–10	–
	onion	ALLIU	*Allium*	2–5	–
Shrub/Vine					
7	**Dominant, evergreen, non-sprouting shrub**			70–200	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	50–150	–
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	20–50	–
8	**Other shrubs**			10–20	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–20	–

Animal community

Livestock grazing-
This site is suitable for livestock grazing use in the late spring, fall and winter under a planned grazing system. Use should be postponed until the soils are firm enough to prevent trampling damage and soil compaction. Grazing management should be keyed to bluebunch wheatgrass and basin wildrye. Bluebunch wheatgrass and basin wildrye can be severely damaged if heavily grazed during periods of flowering and grass seed formation before root reserves have accumulated and soil moisture is low. Deferred grazing or rest is recommended at least once every three years.

Wildlife-
This site offers food and cover for antelope, mule deer, sage grouse and a variety of other birds, rodents and their associated predators. It is an important spring, fall and winter use area for sage grouse, antelope and mule deer.

Hydrological functions

Watershed-
The soils of this site are typically on relatively low terraces next to basin toe slopes. The soils of this site have moderately low to low runoff potential because of their position. The hydrologic cover condition is good when the deep rooted bunchgrass component is greater than 70 percent of potential. The soils are in hydrologic group B.

Other information

This site has good potential for range seeding because of texture, few restrictions and position. Potential doughtiness is the primary restriction.

Inventory data references

NASIS data used to update Physiographic and Soils sections.

Contributors

C Tackman, T Bloomer, A Bahn
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SCS/BLM Team - Hines
TK Stringham - STM

Approval

Kendra Moseley, 3/07/2025

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.

Author(s)/participant(s)	
Contact for lead author	
Date	05/20/2025
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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

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

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

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5. **Number of gullies and erosion associated with gullies:**

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

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
