USDA Natural Resources
Conservation Service

Ecological site R023XY222OR
SHALLOW LAVA 10-12 PZ

Accessed: 05/11/2025

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.

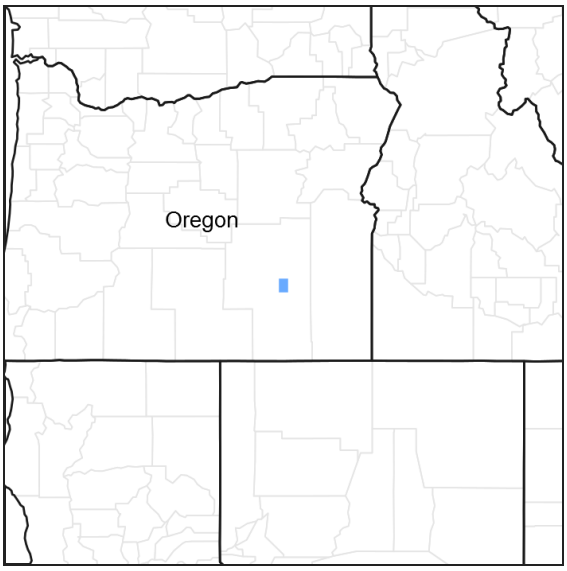

Figure 1. Mapped extent

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

R023XY213OR	**SANDY LOAM 10-12 PZ** Sandy Loam 10-12" PZ

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. tridentata*
Herbaceous	(1) *Achnatherum thurberianum* (2) *Pseudoroegneria spicata ssp. spicata*

Physiographic features

This site occurs on hills with slopes of 1 to 20 percent. Elevations range from 4100 to 4700 feet. It occurs in complex with lava flows.

Table 2. Representative physiographic features

Landforms	(1) Hill
Elevation	4,100–4,700 ft

Slope	1–20%
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 10 to 12 inches, most of which occurs in the form of snow during the months of December through February. Spring rains are common. Localized convection storms occasionally occur during the summer. The soil temperature regime is frigid. Mean annual air temperatures range from 43 to 45 degrees F. The average frost-free period for native plants is from May through June.

Table 3. Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	0 days
Precipitation total (average)	12 in

Influencing water features

Soil features

The soils of this site consist of very shallow and shallow, well-drained soils. The depth to hard bedrock is 4 to 15 inches. Surface textures are generally coarse sands and loams with surface thicknesses of 1 to 3 inches. Subsurface soils are very gravelly loams with thicknesses of 3 to 12 inches. The profile averages 35 to 70 percent gravel sized rock fragments and 5 to 25 percent clay. Permeabililty is moderate. Shrink-swell potential is low. Water and wind erosion potential is slight. The available water holding capacity is about 1 inch.

Table 4. Representative soil features

Parent material	(1) Volcanic ash–basalt (2) Eolian sands–basalt
Surface texture	(1) Very gravelly sandy loam (2) Extremely gravelly loamy sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	4–15 in
Surface fragment cover <=3"	39–46%
Available water capacity (0-40in)	0.6–0.9 in
Soil reaction (1:1 water) (0-40in)	7.4–7.8
Subsurface fragment volume <=3" (Depth not specified)	46%
Subsurface fragment volume >3" (Depth not specified)	2%

Ecological dynamics

Range in Characteristics:

The reference native plant community is dominated by Basin big sagebrush and Thurber needlegrass. Bluebunch wheatgrass and Sandberg bluegrass are common. Indian ricegrass, basin wildrye, and needle-and-thread are

present. Vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs.

Bluebunch wheatgrass decreases and Thurber's needlegrass increases on coarser soil surfaces. Sandberg bluegrass increases with thinner soil surface layers.

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.

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. Rabbitbrush may temporarily increase after fire. Time facilitates the reintroduction of sagebrush. The introduction of invasive annual grasses and forbs transitions into state 2.

State 2: 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. The timing and/or intensity of grazing or prolonged drought 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. Mismanaged grazing and/or prolonged drought leads to a biotic threshold and into state 3.

State 3: 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. Catastrophic wildfire will lead to an abiotic threshold and into state 4.

State 4: 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.

Response to Disturbance:

This site is less susceptible to invasion by cheatgrass than warmer sites, due to frigid soils. As the site deteriorates, big sagebrush, Sandberg bluegrass, and bottlebrush squirreltail increase in plant density while bluebunch wheatgrass and needlegrasses decrease. Invasion by annual grasses and forbs can occur with improper grazing.

State and transition model

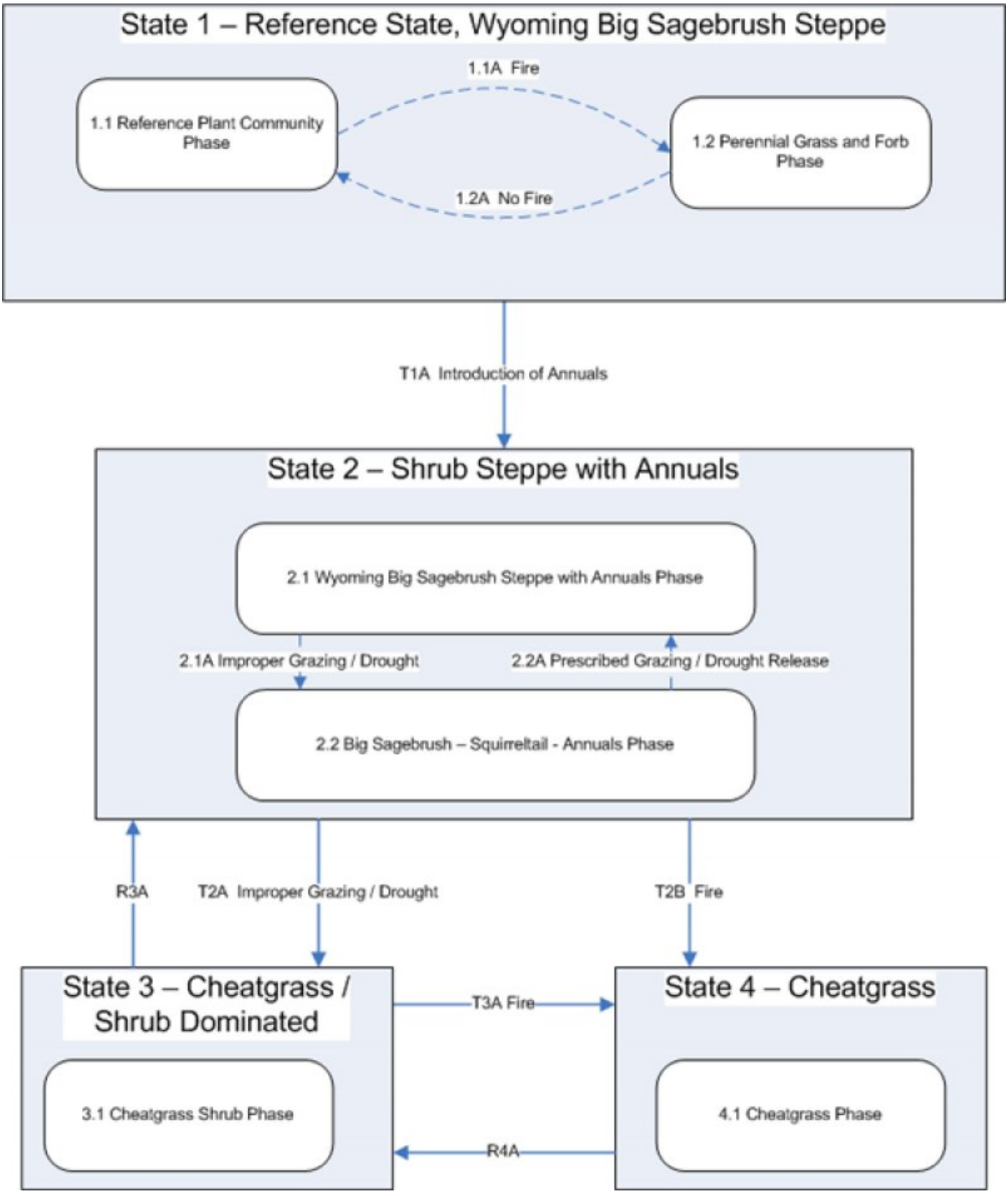

Figure 2. Group 6, STM

State 1
Reference State

Community 1.1
Reference Plant Community

The potential native plant community is dominated by basin big sagebrush and Thurber needlegrass. Bluebunch

wheatgrass and Sandberg bluegrass are common. Indian ricegrass, basin wildrye, and needle-and-thread are present. Vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs. Approximate ground cover is 20-30 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	130	195	260
Shrub/Vine	46	69	92
Forb	20	30	40
Tree	4	6	8
Total	**200**	**300**	**400**

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	**Perennial, deep-rooted, dominant**			105–150	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	60–90	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	45–60	–
3	**Perennial, shallow-rooted, dominant**			30–45	
	Sandberg bluegrass	POSE	*Poa secunda*	30–45	–
5	**Other perennial grasses, all**			6–15	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–6	–
	squirreltail	ELEL5	*Elymus elymoides*	0–6	–
	needle and thread	HECO26	*Hesperostipa comata*	0–6	–
Forb					
9	**Other perennial forbs, all**			3–15	
	balsamroot	BALSA	*Balsamorhiza*	0–3	–
	cryptantha	CRYPT	*Cryptantha*	0–3	–
	buckwheat	ERIOG	*Eriogonum*	0–3	–
	lupine	LUPIN	*Lupinus*	0–3	–
	beardtongue	PENST	*Penstemon*	0–3	–
	wirelettuce	STEPH	*Stephanomeria*	0–3	–
Shrub/Vine					
11	**Perennial, evergreen, dominant**			60–75	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	60–75	–
14	**Perennial, deciduous, sub-dominant**			6–15	
	wax currant	RICE	*Ribes cereum*	6–15	–
15	**Other perennial shrubs, all**			6–15	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	0–6	–
	rabbitbrush	CHRYS9	*Chrysothamnus*	0–6	–
	oceanspray	HODI	*Holodiscus discolor*	0–6	–
Tree					
16	**Perennial, evergreen, dominant**			0–6	
	western juniper	JUOC	*Juniperus occidentalis*	0–6	–

Animal community

Livestock Grazing:

Not suitable for grazing, lava flows restrict livestock movements.

Native Wildlife Associated with the Climax Community:

Pronghorn antelope
Coyote
Sage grouse
Mule deer

Hydrological functions

The soils of this site have moderate infiltration rates and a low run-off potential. The hydrologic soil group is D.

Other information

Low available water capacity in the surface layer limits seedling survival. Shallow depths limits placement of fence posts.

Contributors

Bob Gillaspy
M. Parks (OSU)
SCS/BLM Team - Hines, OR

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)	Jeff Repp and Bruce Frannsen
Contact for lead author	State Rangeland Management Specialist for NRCS - OR
Date	08/17/2012
Approved by	Bob Gillaspy
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** None

3. **Number and height of erosional pedestals or terracettes:** None to few pedestals

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 15-40%

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** None, Slight wind erosion hazard

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

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Slightly to moderately resistant to erosion: aggregate stability = 1-3

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very shallow to shallow coarse sands to loams (3-12 inches thick), gravelly profile: Low OM (1-2%)

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Low ground cover (20-30%) and gentle slopes (1-20%) slightly limit rainfall impact and overland flow

---

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: Thurber needlegrass > Basin big sagebrush > Bluebunch wheatgrass > Sandberg bluegrass > other shrubs > other grasses > forbs

    Sub-dominant:

    Other:

    Additional:

---

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

---

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

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Favorable: 400, Normal: 300, Unfavorable: 200 lbs/acre/year at high RSI (RPC)

---

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:** Western Juniper readily invades the site. Cheatgrass and Medusahead invade sites that have

lost deep rooted perennial grass functional groups.

---

17. **Perennial plant reproductive capability:** All species should be capable of reproducing annually

---