USDA Natural Resources Conservation Service

Ecological site R023XY214OR
CLAYPAN 10-12 PZ

Accessed: 05/13/2025

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.

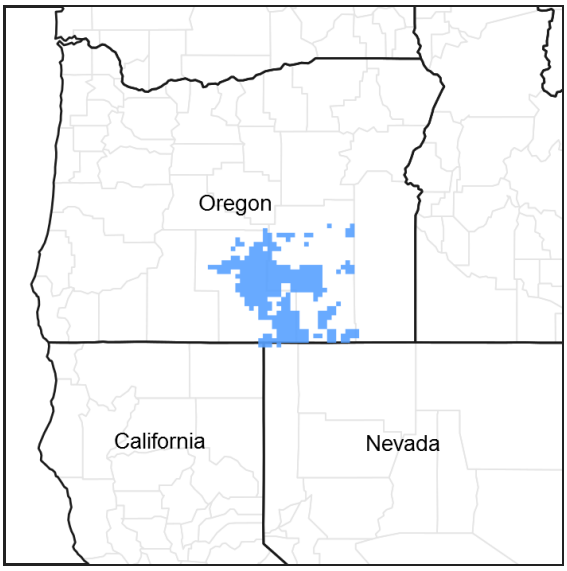


Figure 1. Mapped extent

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

R023XY200OR	**PONDED CLAY** Ponded Clay
R023XY212OR	**LOAMY 10-12 PZ** Loamy 10-12" PZ
R023XY218OR	**THIN SURFACE CLAYPAN 10-16 PZ** Thin Surface Claypan 10-16" PZ
R023XY300OR	**SOUTH SLOPES 10-12 PZ** South Slopes 8-12" PZ
R023XY308OR	**NORTH SLOPES 10-12 PZ** North Slopes 10-12" PZ

Similar sites

R023XY215OR	**SHALLOW GRAVELLY LOAM 10-12 PZ** Shallow Gravelly Loam 10-12" PZ (lacks claypan)
R023XY216OR	**CLAYPAN 12-16 PZ** Claypan 12-16" PZ (higher precipitation)

R023XY220OR	**CLAYEY 10-12 PZ** Clayey 10-12" PZ (weak argillic)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia arbuscula*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This site occurs on nearly level to moderately steep tablelands and alluvial fans. Slope ranges from 0 to 70 percent (commonly less than 30 percent). Elevations range from 4200 to 6200 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan
Elevation	1,280–1,890 m
Slope	0–70%
Water table depth	152 cm

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. The soil temperature regime is typically frigid. Extreme air temperatures range from 100 degrees F to -20 degrees F. The frost-free period is from 50 to 100 days. The optimum period for plant growth is from early April to mid-June.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	0 days
Precipitation total (average)	305 mm

Influencing water features

Soil features

The soils are very shallow to a strongly developed claypan, they are well-drained and have developed in residuum. The permeability is moderate to the bedrock or claypan and slow or very slow in the claypan. The available water holding capacity (AWC) is about 2 to 6 inches for the profile. The surface layer is typically a loam or clay loam to 10 inches thick with variable amounts of coarse fragments on the surface. The majority of the soils in this site have a strongly developed claypan subsoil with an abrupt boundary between it and the surface layer. The claypan contains about 40 to 60 percent clay and the surface layer contains about 20 to 30 percent clay. The other soils in this site are shallow to hard bedrock and typically contain over 40 percent coarse fragments throughout the profile.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Cobbly clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderate to very slow

Surface fragment cover <=3"	0–40%
Surface fragment cover >3"	0–40%
Available water capacity (0-101.6cm)	5.08–15.24 cm
Subsurface fragment volume <=3" (Depth not specified)	0–40%
Subsurface fragment volume >3" (Depth not specified)	0–40%

Ecological dynamics

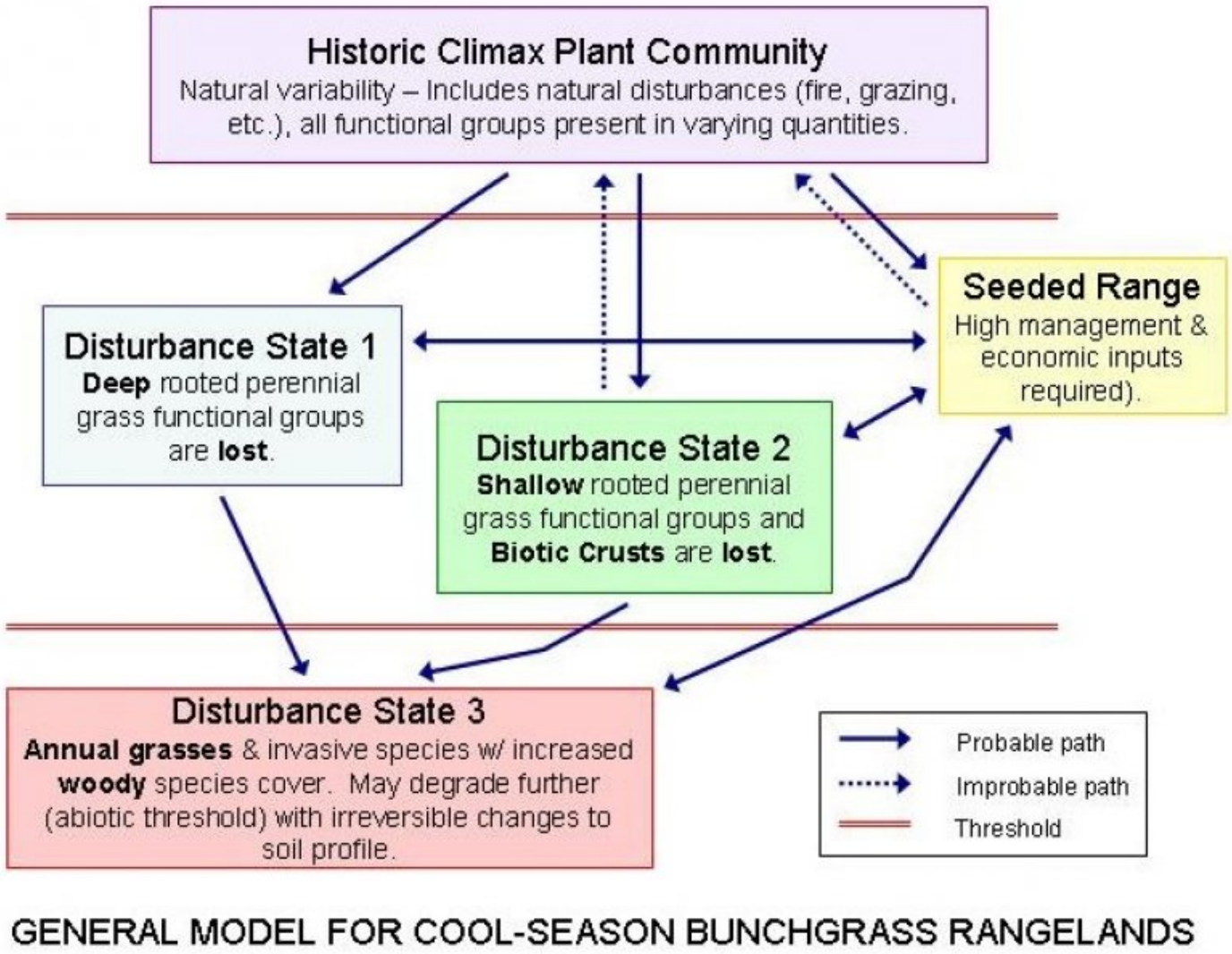
Range in Characteristics:

Variability in production and composition on a site result from changes in soil depth and texture. As the surface becomes thinner, Sandberg bluegrass increases in proportion. Thurber needlegrass will increase as the percent of gravels increase. Thicker soil surfaces favor an increase in Idaho fescue.

Response to Disturbance:

If heavy grazing causes site deterioration, Sandberg bluegrass, annual grasses, forbs, and low sagebrush will increase in percentage of total annual production. Cheatgrass and annual bromegrass are likely to invade this site. Western juniper will increase on this site when the ecological condition has deteriorated. Lack of fire appears to favor the juniper encroachment.

State and transition model



GENERAL MODEL FOR COOL-SEASON BUNCHGRASS RANGELANDS

State 1
Reference State

Community 1.1
Reference Plant Community

The potential native plant community is dominated by bluebunch wheatgrass and low sagebrush. Idaho fescue will occur on those sites with thicker surface layers. Vegetative composition is about 65 percent grasses, 10 percent forbs, and 25 percent shrubs. Approximate ground cover is 20 to 35 percent (basal and crown).

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	219	364	510
Shrub/Vine	84	140	196
Forb	34	56	78
Total	**337**	**560**	**784**

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	**Perennial, deep-rooted, bunchgrass**			168–280	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	168–280	–
2	**Perennial, shallow-rooted, bunchgrass**			28–56	
	Sandberg bluegrass	POSE	*Poa secunda*	28–56	–
3	**Perennial, deep-rooted, bunchgrass**			6–28	
	squirreltail	ELEL5	*Elymus elymoides*	6–28	–
5	**Other perennial grasses**			6–28	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	0–6	–
	Idaho fescue	FEID	*Festuca idahoensis*	0–6	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–6	–
Forb					
7	**Perennial Forbs**			34–84	
	balsamroot	BALSA	*Balsamorhiza*	11–28	–
	desertparsley	LOMAT	*Lomatium*	11–28	–
	lupine	LUPIN	*Lupinus*	11–28	–
9	**Other perennial forbs**			6–28	
	agoseris	AGOSE	*Agoseris*	0–6	–
	pussytoes	ANTEN	*Antennaria*	0–6	–
	milkvetch	ASTRA	*Astragalus*	0–6	–
	blue eyed Mary	COLLI	*Collinsia*	0–6	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	0–6	–
	larkspur	DELPH	*Delphinium*	0–6	–
	fleabane	ERIGE2	*Erigeron*	0–6	–
	buckwheat	ERIOG	*Eriogonum*	0–6	–
	beardtongue	PENST	*Penstemon*	0–6	–
	phlox	PHLOX	*Phlox*	0–6	–
	largehead clover	TRMA3	*Trifolium macrocephalum*	0–6	–
	deathcamas	ZIGAD	*Zigadenus*	0–6	–
Shrub/Vine					
11	**Evergreen**			67–135	
	little sagebrush	ARAR8	*Artemisia arbuscula*	56–112	–
15	**Other shrubs**			6–28	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–6	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	0–6	–
	spiny hopsage	GRSP	*Grayia spinosa*	0–6	–
Tree					
16	**Evergreen**			0–6	
	western juniper	JUOC	*Juniperus occidentalis*	0–6	–

Animal community

Livestock grazing:

This site is suited for cattle, horses, and sheep use in late spring, summer, and fall under a planned grazing system. Deferred grazing is recommened in at least one in three years. Grazing should be delayed until the soil is dry so that damage to plant roots and crowns is avoided.

Native Wildlife Associated with the Potential Climax Community:

Mule deer
Pronghorn antelope
Sage grouse
Quail

During spring, mule deer will feed in the area if adequate escape cover is nearby. Antelope will use this site year round.

Hydrological functions

The soils of this site have medium infiltration rates and slow to rapid runoff potential. The hydrologic soil group is D.

Recreational uses

This site can provide some upland game hunting. Wildflowers can provide opportunities for photographers. This site is easily damaged by off-road vehicle use.

Wood products

Where juniper has encroached on this site, it has the potential for producing fence posts, firewood, and other specialty products.

Other information

The depth to clay, density of clay, and the amount of cobbles hinder range seeding, excavation of pipelines, and fence construction.

Contributors

M. Parks (OSU)
Range Review Team
RC/HB

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
Contact for lead author	Oregon NRCS State Rangeland Management Specialist
Date	08/15/2012
Approved by	Bob Gillaspy
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to some, Moderate sheet & rill erosion hazard

---

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

---

3. **Number and height of erosional pedestals or terracettes:** None to some terracettes on steeper slopes

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-15%

---

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):** Significantly resistant to erosion: aggregate stability = 4-6

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very shallow well drained loams, gravelly loams, gravelly clay loams, clay loams to very cobbly clay loams (10 inches thick) with claypan: Moderate OM (2-4%)

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Low ground cover (20-35%) and gentle to steep slopes (0-70%) slightly to moderately 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: Bluebunch wheatgrass > Low sagebrush > Sandberg bluegrass > forbs > other grasses > other shrubs

    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: 800, Normal: 600, Unfavorable: 400 lbs/acre/year at high RSI (HCPC)

---

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:** Perennial brush species will increase with deterioration of plant community. 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

---