

Ecological site R023XY216OR

CLAYPAN 12-16 PZ

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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.

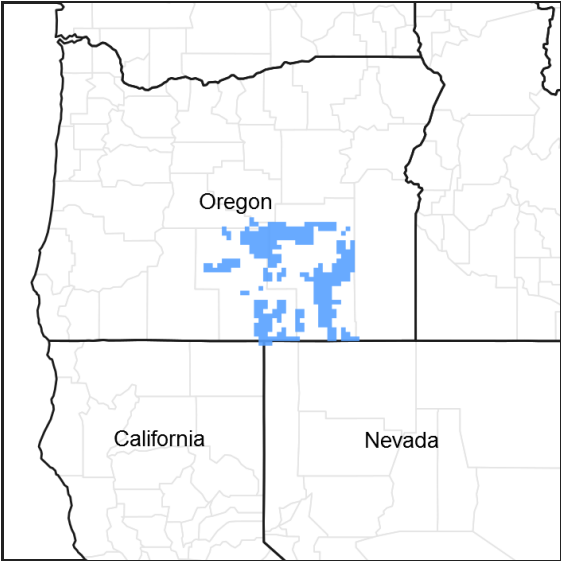


Figure 1. Mapped extent

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

R023XY104OR	LOAMY BOTTOM Loamy Bottom
R023XY218OR	THIN SURFACE CLAYPAN 10-16 PZ Thin Surface Claypan 10-16" PZ
R023XY321OR	DEEP LOAMY 12-16 PZ Deep Loamy 12-16" PZ

Similar sites

R023XY214OR	CLAYPAN 10-12 PZ Claypan 10-12" PZ (lower precipitation)
R023XY218OR	THIN SURFACE CLAYPAN 10-16 PZ Thin Surface Claypan 10-16" PZ (thin surface soil)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula ssp. arbuscula</i>

Herbaceous	(1) <i>Festuca idahoensis</i> (2) <i>Pseudoroegneria spicata</i> ssp. <i>spicata</i>
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Physiographic features

This site occurs on various landforms, ranging from nearly level tablelands and alluvial fans to moderately steep escarpments. Slope ranges from 2 to 30 percent (commonly less than 20 percent). Elevations range from 4500 to 6500 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Escarpment
Elevation	1,372–1,981 m
Slope	2–30%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 12 to 16 inches, most of which occurs in the form of snow during the months of November through March. Occasional spring rains are common. The soil temperatures range from 100 degrees F to -30 degrees F. The frost-free period is from 50 to 100 days. The optimum period for plant growth is from mid-May to mid-July.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	0 days
Precipitation total (average)	406 mm

Influencing water features

Soil features

The soils are very shallow to bedrock or to a strongly developed claypan. The soils 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 5 inches for the profile. The surface layer is typically a loam, 5 to 12 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 27 percent clay. The other soils in this site are very shallow to hard bedrock and typically contain over 60 percent coarse fragments through the profile.

Table 4. Representative soil features

Parent material	(1) Residuum–basalt (2) Colluvium–welded tuff
Surface texture	(1) Very cobbly loam (2) Very stony clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to slow

Soil depth	13–38 cm
Surface fragment cover <=3"	13–25%
Surface fragment cover >3"	10–30%
Available water capacity (0-101.6cm)	3.81–13.21 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	5–25%
Subsurface fragment volume >3" (Depth not specified)	1–20%

Ecological dynamics

Range in Characteristics:

The reference native plant community is dominated by Idaho fescue, bluebunch wheatgrass, and low sagebrush. Vegetative composition is about 60 percent grasses, 10 percent forbs, and 30 percent shrubs.

This site is typically dominated by Idaho fescue. At the lower end of its precipitation range, bluebunch wheatgrass may approach co-dominance. Soils in this site that have a gravelly surface will show an increase in Thurber needlegrass. Idaho fescue production increases with increased soil surface thickness.

Four states have been identified for this site: a reference state; a state with the presence of annuals; a state that has juniper and low sagebrush co-dominant on the site, and a state with annual dominance.

Reference State: Stable plant community affected infrequently by fire. Plant communities are dominated by low sagebrush with some communities exhibiting a small percentage of old growth juniper. Infrequent fire (> 80 to 100 year intervals) maintains site dynamics. Fire reduces shrub cover in a mosaic, patchy pattern. 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/or medusahead and other annual weeds. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Infrequent fire (> 80 to 100 years) reduces shrub cover, removes young juniper and promotes grass production while time since fire allows shrub recovery. Mismanagement of grazing facilitates an increase in Sandberg's bluegrass, weedy species, young juniper and low sagebrush. Moderately deep-rooted bunchgrasses will decline in production and density. Prescribed grazing can reverse the trend. Loss of moderately deep-rooted perennial bunchgrasses with or without an increase in young Juniper brings the site to State 3.

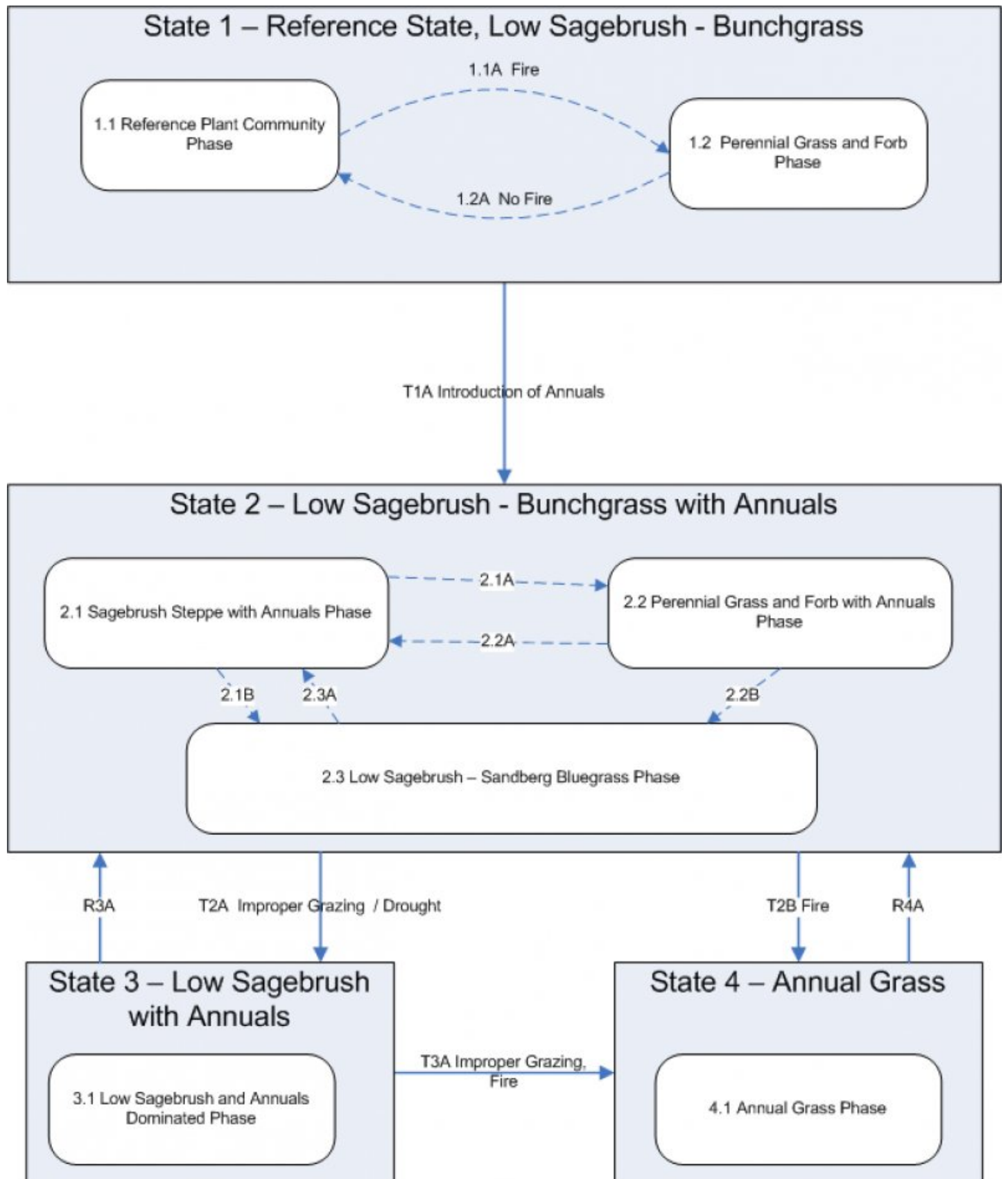
State 3: Dominated by low sagebrush and possibly young juniper with minimal perennial, moderately deep-rooted bunchgrasses. Cheatgrass and/or medusahead along with other weedy forbs have increased in density and cover. Sandberg's bluegrass cover and vigor is declining. Water flow paths are evident. Sagebrush, and possibly juniper, control site resources. Catastrophic wildfire leading to annual dominated plant community will take the site to State 4.

State 4: Cheatgrass and/or medusahead dominated. Few old growth juniper may be present. Rabbitbrush increased with few to no low sagebrush. Wind and water erosion drive site processes.

Response to Disturbance:

If heavy grazing causes site deterioration, Idaho fescue will decline in vigor and density, and bluebunch wheatgrass will follow suit. Less desirable shrubs and forbs will increase. In the absence of fire, western juniper will increase on this site.

State and transition model



State 1
Reference State

Community 1.1

Reference Plant Community

The potential native plant community is dominated by Idaho fescue, bluebunch wheatgrass, and low sagebrush. Vegetative composition is about 60 percent grasses, 10 percent forbs, and 30 percent shrubs. Approximate ground cover is 20-30 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	336	471	605
Shrub/Vine	146	207	269
Forb	56	78	101
Tree	22	28	34
Total	560	784	1009

Community 1.2

Perennail Grass and Forb Community

Patchy reduction in shrub density due to fire. The potential native plant community is dominated by Idaho fescue, bluebunch wheatgrass, and low sagebrush. Vegetative composition is about 70 percent grasses, 20 percent forbs, and 10 percent shrubs. Approximate ground cover is 20-30 percent (basal and crown).

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	392	549	706
Forb	112	157	202
Shrub/Vine	34	50	67
Tree	22	28	34
Total	560	784	1009

Pathway 1.1A

Community 1.1 to 1.2

Infrequent fire (> 80 to 100 year intervals) maintained site dynamics. Fire reduced shrub cover in a mosaic, patchy pattern.

Conservation practices

Prescribed Burning

Pathway 1.2A

Community 1.2 to 1.1

Time since fire allows low sagebrush to increase.

Conservation practices

Prescribed Grazing

State 2

Low Sagebrush - Bunchgrass with Annuals

Compositionally similar to the reference state with a trace of cheatgrass and/or medusahead and other annual weeds. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Infrequent fire (> 80 to 100 years) reduces shrub cover, removes young juniper and promotes grass production while time since fire allows shrub recovery.

Community 2.1 Sagebrush Steppe with Annuals

Compositionally similar to the reference community with a trace of cheatgrass and/or medusahead and other annual weeds.

Community 2.2 Perennial Grass and Forb with Annuals

Patchy reduction in shrub density due to fire. The potential native plant community is dominated by Idaho fescue, bluebunch wheatgrass, and low sagebrush. Vegetative composition is about 70 percent grasses, 20 percent forbs, and 10 percent shrubs. Approximate ground cover is 20-30 percent (basal and crown). Annual grasses and forbs are present.

Community 2.3 Low Sagebrush - Sandberg Bluegrass

Plant community is dominated by low sagebrush and Sandberg bluegrass. Idaho fescue and bluebunch wheatgrass have decreased in production and cover.

Pathway 2.1A Community 2.1 to 2.2

Fire (> 80 to 100 years) reduces shrub cover, removes young juniper, and promotes grass production.

Conservation practices

Prescribed Burning

Pathway 2.1B Community 2.1 to 2.3

Improper grazing facilitates an increase in Sandberg's bluegrass, weedy species, young juniper and low sagebrush. Moderately deep-rooted bunchgrasses decline in production and density.

Pathway 2.2A Community 2.2 to 2.1

Time since fire allows shrub recovery.

Conservation practices

Prescribed Grazing

Pathway 2.2B Community 2.2 to 2.3

Improper grazing facilitates an increase in Sandberg's bluegrass, weedy species, young juniper and low sagebrush. Moderately deep-rooted bunchgrasses decline in production and density.

Pathway 2.3A

Community 2.3 to 2.1

Prescribed grazing allows medium-rooted perennial bunchgrasses to become dominant.

Conservation practices

Prescribed Grazing

State 3

Low Sagebrush with Annuals

Low sagebrush and possibly young juniper dominated, with minimal perennial, moderately deep-rooted grasses. Cheatgrass and/or medusahead along with other weedy forbs are increased in density and cover. Sandberg's bluegrass cover and vigor is declining. Water flow paths are evident. Low sagebrush, and possibly juniper, control site resources.

Community 3.1

Low Sagebrush and Annuals

Site is dominated by low sagebrush and annual grasses. Juniper density and cover has increased. Soil erosion is evident. Bare ground has increased.

State 4

Annual Grass

Cheatgrass and/or medusahead dominated. Few old growth juniper may be present. Rabbitbrush increased with few to no low sagebrush. Wind and water erosion drive site processes.

Community 4.1

Annual Grasses

Site is dominated by annual grasses and forbs. Rabbitbrush has increased. Soil erosion is evident.

Transition T1A

State 1 to 2

Introduction of Annuals

Transition T2A

State 2 to 3

Low sagebrush dominates with a possible co-dominate of young juniper. Moderately deep-rooted perennial bunchgrasses are rare. Cheatgrass and/or medusahead and other weedy annuals are abundant. Bare ground is significant and water flow paths evident. Sandberg's bluegrass is pedestalled and reduced in vigor and/or cover. This site has crossed a biotic threshold.

Transition T2B

State 2 to 4

Catastrophic wildfire leading to annual dominated plant community.

Restoration pathway R3A

State 3 to 2

Requires mechanical or chemical treatment of sagebrush or mechanical treatment of juniper along with treatment of cheatgrass and/or medusahead. Desired grasses and forbs may need to be seeded. Low success rate.

Conservation practices

Brush Management
Prescribed Grazing
Range Planting

Transition T3A
State 3 to 4

Catastrophic wildfire leading to annual dominated plant community.

Restoration pathway R4A
State 4 to 2

Requires mechanical and/or chemical treatment of annual grasses along with seeding of perennial grass and shrubs. Chemical treatment of rabbitbrush may be needed. High probability of failure.

Conservation practices

Brush Management
Range Planting
Integrated Pest Management (IPM)

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Perennial, deep-rooted, dominant			392–667	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	314–471	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	78–196	–
2	Perennial, deep-rooted, sub-dominant			24–118	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	16–78	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	8–39	–
4	Perennial, shallow-rooted, sub-dominant			16–78	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	16–78	–
5	Other perennial grasses, all			8–39	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–8	–
	Cusick's bluegrass	POCU3	<i>Poa cusickii</i>	0–8	–
Forb					
7	Perennial, all, dominant			8–24	
	phlox	PHLOX	<i>Phlox</i>	8–24	–
8	Perennial, all, sub-dominant			8–16	
	desertparsley	LOMAT	<i>Lomatium</i>	8–16	–
9	Other perennial forbs, all			16–78	
	agoseris	AGOSE	<i>Agoseris</i>	0–16	–
	pussytoes	ANTEN	<i>Antennaria</i>	0–16	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–16	–
	balsamroot	BALSA	<i>Balsamorhiza</i>	0–16	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–16	–
	larkspur	DELPH	<i>Delphinium</i>	0–16	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–16	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–16	–
	aster	EUCEP2	<i>Eucephalus</i>	0–16	–
	lupine	LUPIN	<i>Lupinus</i>	0–16	–
	beardtongue	PENST	<i>Penstemon</i>	0–16	–
	largehead clover	TRMA3	<i>Trifolium macrocephalum</i>	0–16	–
Shrub/Vine					
11	Perennial, evergreen, dominant			78–118	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	78–118	–
12	Perennial, evergreen, sub-dominant			8–16	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–8	–
Tree					
16	Perennial, evergreen, dominant			16–39	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	16–39	–

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Perennial, deep-rooted, dominant			370–572	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	269–404	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	101–168	–
2	Perennial, deep-rooted, sub-dominant			36–146	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	22–78	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	13–67	–
4	Perennial, shallow-rooted, sub-dominant			13–67	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	13–67	–
5	Other perennial grasses, all			7–34	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–17	–
	bluegrass	POA	<i>Poa</i>	0–17	–
Forb					
7	Perennial, all, dominant			13–40	
	phlox	PHLOX	<i>Phlox</i>	13–40	–
8	Perennial, all, sub-dominant			13–27	
	desertparsley	LOMAT	<i>Lomatium</i>	13–27	–
9	Other perennial forbs, all			27–135	
	agoseris	AGOSE	<i>Agoseris</i>	0–11	–
	pussytoes	ANTEN	<i>Antennaria</i>	0–11	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–11	–
	balsamroot	BALSA	<i>Balsamorhiza</i>	0–11	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–11	–
	larkspur	DELPH	<i>Delphinium</i>	0–11	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–11	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–11	–
	aster	EUCEP2	<i>Eucephalus</i>	0–11	–
	lupine	LUPIN	<i>Lupinus</i>	0–11	–
	beardtongue	PENST	<i>Penstemon</i>	0–11	–
	largehead clover	TRMA3	<i>Trifolium macrocephalum</i>	0–11	–
Shrub/Vine					
11	Perennial, evergreen, dominant			17–28	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	17–28	–
12	Perennial, evergreen, sub-dominant			22–34	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	22–34	–
Tree					
16	Perennial, evergreen, dominant			16–39	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	16–39	–

Animal community

Livestock Grazing:

This site is suitable for cattle, horses, and sheep use in late spring, summer, and fall under a planned grazing

system. Deferred 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 slow infiltration rates and slow to rapid runoff potential. The hydrologic soil group is D.

Wood products

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

Contributors

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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 Franssen
Contact for lead author	State Rangeland Management Specialist for NRCS - OR
Date	08/16/2012
Approved by	Bob Gillaspy
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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):** 5-15%
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5. **Number of gullies and erosion associated with gullies:** None
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None, moderate wind erosion hazard
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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):** Moderately resistant to erosion: aggregate stability = 3-5
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Very shallow, well drained very stony or cobbly clay loams, silty clay loams, or very stony loams (5-12" thick), with up to 60% coarse fragments on the surface: Moderate OM (1-3%)
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Slight ground cover (20-30%) and gentle to moderate slopes (2-30%) 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 - claypan at 5-12"
-
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: Idaho fescue > Bluebunch wheatgrass > other grasses > shrubs > forbs > trees
- 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: 900, Normal: 700, Unfavorable: 500 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:** 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
