

Ecological site R010XY009OR Sandy Bottom

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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.

MLRA notes

Major Land Resource Area (MLRA): 010X—Central Rocky and Blue Mountain Foothills

This MLRA is characterized by gently rolling to steep hills, plateaus, and low mountains at the foothills of the Blue Mountains in Oregon and the Central Rocky Mountains in Idaho. The geology of this area is highly varied and ranges from Holocene volcanics to Cretaceous sedimentary rocks. Mollisols are the dominant soil order and the soil climate is typified by mesic or frigid soil temperature regimes, and xeric or aridic soil moisture regimes. Elevation ranges from 1,300 to 6,600 feet (395 to 2,010 meters), increasing from west to east. The climate is characterized by dry summers and snow dominated winters with precipitation averaging 8 to 16 inches (205 to 405 millimeters) and increasing from west to east. These factors support plant communities with shrub-grass associations with considerable acreage of sagebrush grassland. Big sagebrush, bluebunch wheatgrass, and Idaho fescue are the dominant species. Stiff sagebrush, low sagebrush, and Sandberg bluegrass are often dominant on sites with shallow restrictive layers. Western juniper is one of the few common tree species and since European settlement has greatly expanded its extent in Oregon. Nearly half of the MLRA is federally owned and managed by the Bureau of Land Management. Most of the area is used for livestock grazing with areas accessible by irrigation often used for irrigated agriculture.

Ecological site concept

In reference condition, this site supports a highly productive bottomland plant community dominated by is dominated by great basin wildrye (*Leymus cinereus*) with needle and thread (*Hesperostipa comata*) and basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) also common. Abiotically, this site is characterized by nearly level slopes on floodplains or swales with typically deep alluvial soils. The soil temperature regime of this site is mesic. Historically, the ecological dynamics of this site were driven by fire and drought. Presently, reference conditions are less common and current dynamics are also influenced by the spread of invasive species, livestock grazing pressures and fire suppression.

This is a provisional ecological site whose accelerated development from a draft site was undertaken with little to no field verification and is subject to extensive review and revision before final approval. All data herein was developed using existing information and literature and should be considered provisional and contingent upon field validation prior to use in conservation planning.

Associated sites

R010XY010OR	Coyote Willow Riparian Adjacent riparian areas dominated by narrowleaf willow
R010XY005OR	Loamy Bottom Adjacent bottomlands with loamy soils

Similar sites

R010XY007OR	Sodic Bottom Soils are sodic
R010XY014OR	Clayey Bottom Soils are clayey
R010XY005OR	Loamy Bottom Soils are loamy

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Leymus cinereus</i> (2) <i>Hesperostipa comata</i>

Physiographic features

This site occurs on nearly level to gently sloping floodplains, terraces and swales. Slopes range from 0 to 10 percent. Elevation varies from 1,400 to 2,400 feet (425 to 650 meters). A water table from 48 to 72 inches (120 to 180 cm) below the surface may occur during winter and spring months.

Table 2. Representative physiographic features

Landforms	(1) Valley > Flood plain (2) Valley > Swale (3) Valley > Terrace
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	Very rare to occasional
Ponding frequency	None
Elevation	1,400–2,400 ft
Slope	0–10%
Water table depth	48–72 in
Aspect	Aspect is not a significant factor

Climatic features

This site receives 9 to 12 inches (225 to 300mm) of mean annual precipitation primarily as rain November through April. This site has a mesic soil temperature regime and a frost-free period of approximately 100 to 180 days. Climate graphs are based on the nearest available climate stations to representative site locations and are provided to indicate general climate patterns.

Table 3. Representative climatic features

Frost-free period (characteristic range)	100-180 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	9-12 in
Frost-free period (average)	140 days
Freeze-free period (average)	
Precipitation total (average)	11 in

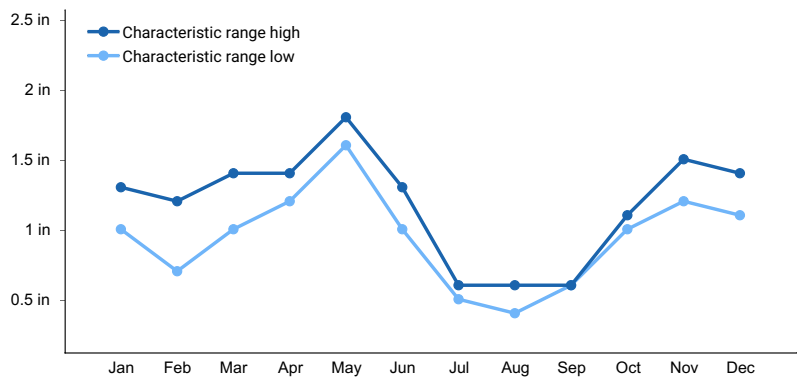


Figure 1. Monthly precipitation range

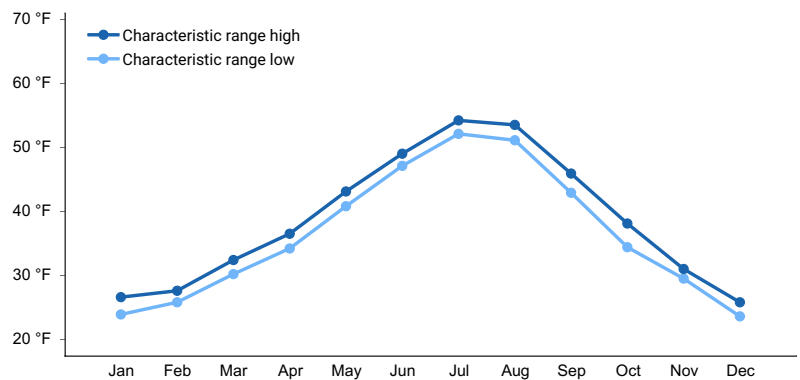


Figure 2. Monthly minimum temperature range

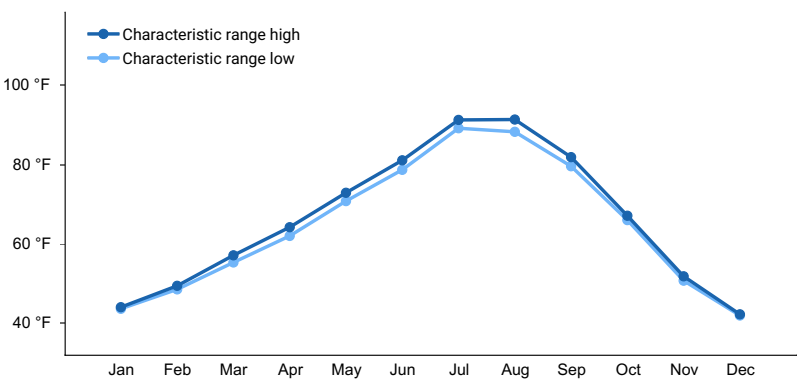


Figure 3. Monthly maximum temperature range

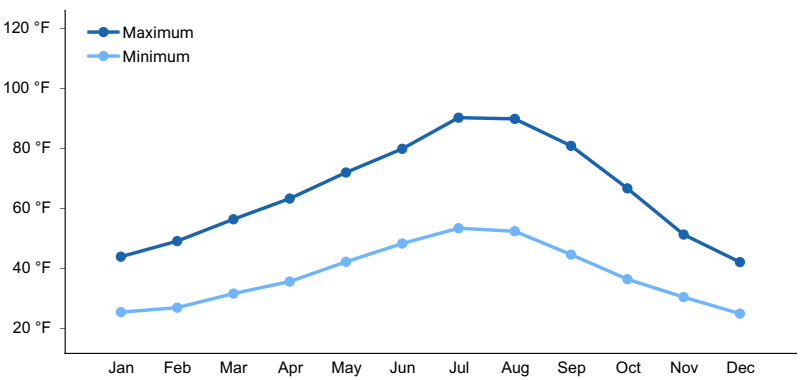


Figure 4. Monthly average minimum and maximum temperature

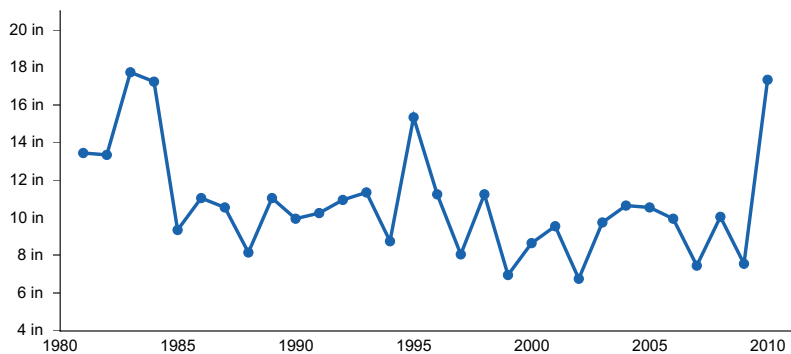


Figure 5. Annual precipitation pattern

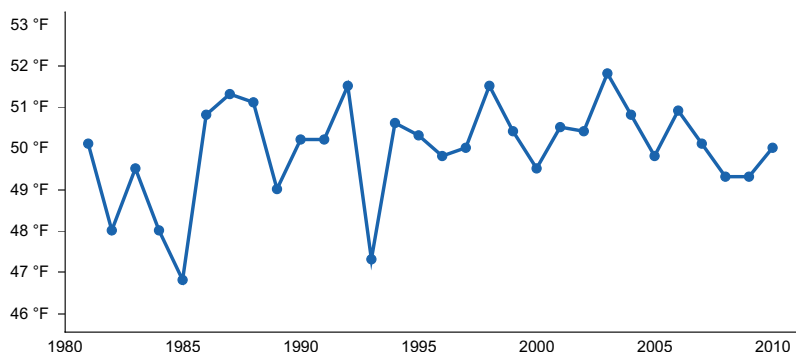


Figure 6. Annual average temperature pattern

Climate stations used

- (1) MONUMENT 2 [USC00355711], Monument, OR
- (2) JOHN DAY 35 WNW [USW00004125], Mitchell, OR
- (3) MITCHELL 2 NW [USC00355641], Mitchell, OR

Influencing water features

The water table of this site is influenced by the adjacent stream course which will vary depending on the contributing area as well as the biotic and hydrologic integrity of the surrounding watershed.

Wetland description

Not applicable

Soil features

Typically a deep to very deep fine sandy to sandy loam derived from alluvium. Family particle size is typically coarse loamy or coarse-loamy over sandy or sandy-skeletal. See Kimberly for a typical soil correlated to this site.

Table 4. Representative soil features

Parent material	(1) Alluvium–volcanic and sedimentary rock
Surface texture	(1) Sandy loam (2) Fine sandy loam
Family particle size	(1) Coarse-loamy over sandy or sandy-skeletal (2) Coarse-loamy
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Moderately slow to rapid
Depth to restrictive layer	40–80 in

Soil depth	40–80 in
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–15%
Available water capacity (0-40in)	3–6 in
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (4-60in)	0–45%
Subsurface fragment volume >3" (4-60in)	0–15%

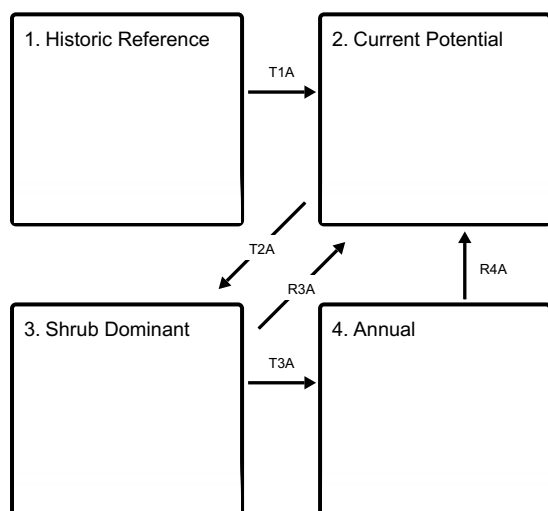
Ecological dynamics

The reference plant community is characterized by basin wildrye (LECI4), needle and thread (HECO26), and basin big sagebrush (ARTRT). Basin wildrye increases with seasonal availability of subsurface lateral water flows. Needleandthread increases on drier sites with limited subsurface flows. Basin big sagebrush increases in the absence of fire. This is a highly productive site with average production varying between 2000 and 5000 pounds per acre.

Overgrazing causes a decrease in basin wildrye and an increase in basin big sagebrush along with an increase in creeping wildrye, greasewood and rabbitbrush if present. Continued deterioration of these sites promotes shrub dominance, increased bare ground and the invasion of annual weeds, primarily cheatgrass. On sites with salt affected soils, surface conditions become increasingly sodic. Long-term abusive grazing may eliminate understory grasses and promote a decadent sagebrush stand with a cheatgrass understory (Stringham, 2009).

State and transition model

Ecosystem states



T1A - Introduction of invasive plant species

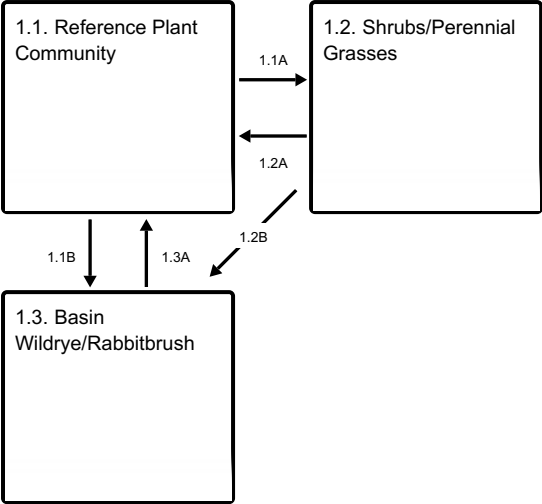
T2A - Prolonged, improperly managed grazing, possibly in combination with a long interval in the absence of fire.

R3A - Requires mechanical or herbicide treatment of brush species and control of invasive weeds. Fire is not recommended. If basin wildrye is not apparent, seeding may be required.

T3A - Further prolonged improperly managed grazing, fire

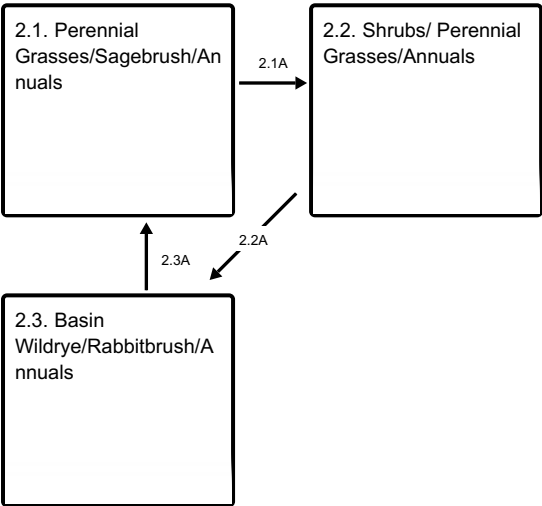
R4A - Requires control of invasive weeds. Fire is not recommended . If basin wildrye is not apparent, seeding will likely be required.

State 1 submodel, plant communities



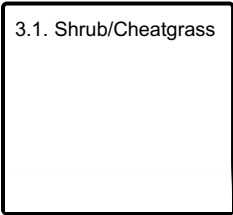
- 1.1A - Chronic Drought or abusive grazing practices
- 1.1B - Chronic Drought or abusive grazing practices
- 1.2A - Low intensity fire combined with prescribed grazing
- 1.2B - Low intensity fire combined with prescribed grazing
- 1.3A - Low intensity fire combined with prescribed grazing

State 2 submodel, plant communities



- 2.1A - Chronic drought or abusive grazing practices
- 2.2A - Low intensity fire combined with prescribed grazing
- 2.3A - Low intensity fire combined with prescribed grazing

State 3 submodel, plant communities



State 4 submodel, plant communities

4.1. Cheatgrass

State 1 Historic Reference

Community phase changes are a function of fire and/or chronic drought. The existence of the reference state today is rare. Fire played a significant role in the community phase dynamics of the reference state; however, the time between fires would be highly variable and dependent upon the location and productivity of the site. Chronic drought leads to a reduction in native grasses and an increase in sagebrush or greasewood dominance while low-intensity fire maintains state dynamics.

Dominant plant species

- basin wildrye (*Leymus cinereus*), grass
- needle and thread (*Hesperostipa comata ssp. comata*), grass

Community 1.1 Reference Plant Community

Dominated by herbaceous vegetation, primarily basin wildrye, needle and thread, and thickspike wheatgrass. Scattered basin big sagebrush.

Dominant plant species

- basin wildrye (*Leymus cinereus*), grass

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1900	2850	4760
Shrub/Vine	100	150	240
Forb	—	—	—
Total	2000	3000	5000

Community 1.2 Shrubs/Perennial Grasses

Sagebrush and other shrubs increase; grass production declines; rabbitbrush may increase, bare ground increases.

Community 1.3 Basin Wildrye/Rabbitbrush

Sagebrush and other shrubs decline; basin wildrye increases; rabbitbrush may increase.

Pathway 1.1A Community 1.1 to 1.2

Chronic Drought or abusive grazing practices

Pathway 1.1B

Community 1.1 to 1.3

Chronic Drought or abusive grazing practices

Pathway 1.2A

Community 1.2 to 1.1

Low intensity fire combined with prescribed grazing

Pathway 1.2B

Community 1.2 to 1.3

Low intensity fire combined with prescribed grazing

Pathway 1.3A

Community 1.3 to 1.1

Low intensity fire combined with prescribed grazing

State 2

Current Potential

Compositionally similar to the reference state with the addition of a trace of annual weeds, primarily cheatgrass. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Abusive grazing practices and or chronic drought leads to a reduction in native grasses and an increase in sagebrush or greasewood dominance creating an at-risk community phase (CP1). Low-intensity fire combined with prescribed grazing maintains state dynamics (CP2 & CP3).

Dominant plant species

- basin wildrye (*Leymus cinereus*), grass
- needle and thread (*Hesperostipa comata* ssp. *comata*), grass

Community 2.1

Perennial Grasses/Sagebrush/Annuals

Dominated by herbaceous vegetation, primarily basin wildrye, needle and thread, and thickspike wheatgrass. Scattered basin big sagebrush; cheatgrass or other annual weeds present in trace amounts.

Community 2.2

Shrubs/ Perennial Grasses/Annuals

Sagebrush and other shrubs increase; grass production declines; rabbitbrush may increase; bare ground increases; cheatgrass or other annuals increase (At Risk Phase).

Community 2.3

Basin Wildrye/Rabbitbrush/Annuals

Sagebrush and other shrubs decline; basin wildrye increases; rabbitbrush may increase; cheatgrass present.

Pathway 2.1A

Community 2.1 to 2.2

Chronic drought or abusive grazing practices

Pathway 2.2A

Community 2.2 to 2.3

Low intensity fire combined with prescribed grazing

Pathway 2.3A

Community 2.3 to 2.1

Low intensity fire combined with prescribed grazing

State 3

Shrub Dominant

Decadent sagebrush dominates the overstory and cheatgrass dominates the understory. A significant reduction/loss of basin wildrye and other grasses is apparent. 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.

Dominant plant species

- basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), shrub
- greasewood (*Sarcobatus vermiculatus*), shrub
- rabbitbrush (*Chrysothamnus*), shrub
- broom snakeweed (*Gutierrezia sarothrae*), shrub

Community 3.1

Shrub/Cheatgrass

Decadent sagebrush is dominant; greasewood and rabbitbrush may be significant overstory components; cheatgrass dominates the understory; basin wildrye and other perennial grasses are trace; bare ground increases.

State 4

Annual

The site has crossed an abiotic threshold and ecological dynamics are determined by frequent fire, cheatgrass dominance, lack of shrubby plants, bare ground, soil movement by wind and water erosion.

Dominant plant species

- cheatgrass (*Bromus tectorum*), grass
- medusahead (*Taeniatherum caput-medusae*), grass

Community 4.1

Cheatgrass

Cheatgrass and other annuals dominant; bare ground prominent.

Transition T1A

State 1 to 2

Introduction of invasive plant species

Transition T2A

State 2 to 3

Prolonged, improperly managed grazing, possibly in combination with a long interval in the absence of fire.

Constraints to recovery. Irreversible transition has occurred and a biotic threshold has been crossed. Brush species and cheatgrass control site dynamics.

Restoration pathway R3A

State 3 to 2

Requires mechanical or herbicide treatment of brush species and control of invasive weeds. Fire is not recommended. If basin wildrye is not apparent, seeding may be required.

Transition T3A

State 3 to 4

Further prolonged improperly managed grazing, fire

Constraints to recovery. Irreversible transition has occurred and an abiotic threshold has been crossed. Frequent fire promotes maintenance of cheatgrass dominance. Wind and water erosion of soil increases and may become a dominant ecological process driving site dynamics.

Restoration pathway R4A

State 4 to 2

Requires control of invasive weeds. Fire is not recommended . If basin wildrye is not apparent, seeding will likely be required.

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 Grasses			2100–3000	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	1800–2250	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	150–450	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	150–300	–
2	Other Perennial Grasses			–	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	–	–
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	–	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	–	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	–	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	–	–
3	Big Bluegrass			90–150	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	90–150	–
Forb					
4	Forbs			–	
	milkvetch	ASTRA	<i>Astragalus</i>	–	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	–	–
	lupine	LUPIN	<i>Lupinus</i>	–	–
	buckwheat	ERIOG	<i>Eriogonum</i>	–	–
	desertparsley	LOMAT	<i>Lomatium</i>	–	–
	phlox	PHLOX	<i>Phlox</i>	–	–
Shrub/Vine					
7	Shrubs			60–210	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	60–150	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–60	–
8	Other Shrubs			–	
	rabbitbrush	CHRY9	<i>Chrysothamnus</i>	0	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	0	–

References

. Fire Effects Information System. <http://www.fs.fed.us/database/feis/>.

. 2021 (Date accessed). USDA PLANTS Database. <http://plants.usda.gov>.

Other references

Stringham, T.K. 2009. Final Report for Agreement No. 68-0436-8-040 USDA Ecological Site Description MLRA D23 & D24. University of Nevada, Reno.

Contributors

Jenni Moffitt, general updates 2020
Ed Petersen, Alan Bahn, original authors

Approval

Kirt Walstad, 3/11/2025

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	08/07/2012
Approved by	Kirt Walstad
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:** Occasional flooding with seasonal high water table

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0-10%

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine to moderately coarse - 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 = 2-4

-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Deep, well drained with a fine sandy loam to a sandy loam surface: Low to moderate OM (1-4%)
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Significant ground cover (90-100%) and gentle slopes (0-10%) effectively 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: Basin wildrye > Needle and thread = Thickspike wheatgrass > other grasses > shrubs > 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: 3000, normal: 2000, Unfavorable: 1000 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 forb and brush species will increase with deterioration of plant community. Cheatgrass invades sites that have lost deep rooted perennial grass functional groups.
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17. **Perennial plant reproductive capability:** All species should be capable of reproducing annually
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