Ecological site R023XY104OR
LOAMY 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.

Ecological site concept

This site typically occurs on low terraces associated with intermittent or perennial drainage systems or on low terraces on large lake basins. Elevations range from 4000 to 5500 feet and slopes range from 0 to 7 percent. The soils associated with this site are deep to moderately deep. Available moisture for plant growth is augmented by run-on water and a seasonal water table. The soil climate is frigid (soil temperature regime) and xeric (soil moisture regime). The reference plant community is characterized by basin big sagebrush in the overstory and basin wildrye dominating the understory, Nevada bluegrass and creeping wildrye are also common in the understory.

Associated sites

R023XY115OR	WET MARSH
R023XY117OR	BASIN WET MEADOW
R023XY118OR	BASIN DRY MEADOW
R023XY414OR	SEMI WET MEADOW

Similar sites

R023XY009NV	LOAMY BOTTOM 8-12 P.Z.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. tridentata*
Herbaceous	(1) *Leymus cinereus*

Physiographic features

This site typically occurs on low terraces associated with intermittent or perennial drainage systems or on low terraces on large lake basins. Slopes range from 0 to 7 percent. Elevations range from 4000 to 5500 feet.

Table 2. Representative physiographic features

Landforms	(1) Terrace--stream or lake
Flooding frequency	None
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	1,220 – 1,680 m
Slope	0 – 10 %
Water table depth	80 – 150 cm
Aspect	Aspect is not a significant factor

Climatic features

The annual precipitation ranges from 10 to 16 inches, most of which occurs in the form of snow during December through February. This moisture is augmented by run-on water and a seasonal water table allowing the site to occur across a large climatic gradient. The soil temperature regime is frigid. Extreme temperatures range from 110 degrees F to -30 degrees F. The frost-free period is from 50 to 90 days. The optimum period for plant growth is early April through July.

Precipitation is augmented by run-on water and seasonal water table.

Table 3 Representative climatic features

Frost-free period (characteristic range)	50-70 days
Freeze-free period (characteristic range)	110-110 days
Precipitation total (characteristic range)	250-410 mm
Frost-free period (average)	60 days
Freeze-free period (average)	110 days
Precipitation total (average)	310 mm

- (1) O O RCH [USC00356302], Riley, OR
- (2) MALHEUR REFUGE HQ [USC00355162], Burns, OR
- (3) P-RANCH SOUTH PLACE [USC00356853], Princeton, OR

Influencing water features

This site is influenced by run-on water from adjacent sites and a seasonal water table between 30 and 60 inches.

Soil features

The soils of this site are deep to moderately deep, moderately well-drained to well-drained, and medium to fine-textured. Soils are derived from alluvium or lacustrine deposits. The surface layer is typically a silt loam. The subsoil and substratum is typically silt loam or loam. Permeability is moderate to moderately slow. The available water holding capacity (AWC) is 10 to 15 inches for the profile. Depth to water table is usually greater than 60 inches, but may be in the root zone during part of the growing season.

Representative soil series for this site is Widowspring.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Lacustrine deposits
Surface texture	(1) Silt loam
Family particle size	(1) Fine-silty (2) Fine-loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately slow
Soil depth	100 – 250 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	20.32 – 22.86 cm
Soil reaction (1:1 water) (0-101.6cm)	6.5 – 10

Subsurface fragment volume <=3" (0-101.6cm)	0 – 10 %
Subsurface fragment volume >3" (0-101.6cm)	Not specified

Ecological dynamics

The reference plant community is dominated by basin wildrye with basin big sagebrush in the overstory. Creeping wildrye and Nevada bluegrass are also common. The site occurs on low terraces associated with intermittent or perennial drainage systems or on low terraces on large lake basins. Available moisture for plant growth is augmented by run-on water and a seasonal water table allowing the site to occur across a large climatic gradient.

The site has moderate resilience to disturbance and resistance to invasion (Stringham et al. 2015). Resilience is a system's capacity to regain its structure, processes, and function following stressors or disturbance (e.g. drought or fire). Resistance is the capacity of the system to retain its structure, processes, and function despite stressors or disturbances (including pressure from invasive species) (Chambers 2014). Increased resilience increases with elevation, aspect, increased precipitation and increased nutrient availability (Stringham et al. 2015); where greater resource availability and more favorable environmental conditions exist for plant growth and reproduction (Chambers 2014). High available soil moisture allows this site to be highly productive. This added productivity results in fewer open spaces where invasive annual grasses and undesirable forbs can become established.

A primary disturbances on this ecological site are drought, fire, flooding, Aroga infestation (Aroga websteri), and channel incision or other disturbance leading to a lowered seasonal water table. This facilitates an increase in shrubs and a decrease in basin wildrye. Troublesome non-native weeds such as broadleaved pepperweed (or tall whitetop, Lepidium latifolium), hoary cress (or whitetop, Cardaria draba), scotch cottonthistle (Onopordum acanthium), or bull thistle (Cirsium vulgare) are potential invaders on this site.

Basin wildrye is a large, cool-season, perennial bunchgrass with an extensive deep, coarse fibrous, weakly rhizomatous, root system (Reynolds and Fraley 1989, Zschaechner 1985). Clumps may reach up to six feet in height (Ogle et al. 2012). Basin wildrye does not tolerate long periods of inundation; it prefers cycles of wet winters and dry summers and is most commonly found in deep soils with high water holding capacities or seasonally high water tables (Ogle et al. 2012, Perryman and Skinner 2007).

Although no longer considered a different species than Sandberg's bluegrass, ecologically speaking Nevada bluegrass occupies a different ecological niche and is not as grazing tolerant as Sandberg bluegrass. The species occurs throughout an unusually wide elevational range from a few hundred feet above sea level to near 11,000 feet in Colorado. It is often found along partially shaded stream banks and creek bottoms, irrigated fields and meadows and where moisture is plentiful has produced a good enough stand to be hayed (USDA 1988).

Hydrology:
The typical seasonally high water table occurs at depths within 60 inches of the surface which allows for significant production of basin wildrye. Seasonally high water tables have been found necessary for maintenance of site productivity and reestablishment of basin wildrye stands following disturbances such as fire, drought or excessive herbivory (Eckert et al. 1973). The sensitivity of basin wildrye seedling establishment to reduced soil water availability is increased as soil pH increases (Stuart et al. 1971). Lowering of the water table through extended drought, channel incision or water pumping will decrease basin wildrye production and establishment while sagebrush, black greasewood, rabbitbrush, and invasive weeds increase. Farming and abandonment may facilitate the creation of surface vesicular crust, increased surface ponding and decreased infiltration; which leads to dominance by sprouting shrubs with a weedy understory.

Fire Ecology:
Fire return intervals in basin big sagebrush are intermediate between mountain big sagebrush (15 to 25 years) and Wyoming big sagebrush (10 to 70 years). A naturally wide variation in fire frequency in this system is expected. Basin big sagebrush is readily killed when aboveground plant parts are charred by fire. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire.

Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions. Nevada bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil.

Adapted from: Stringham, T.K., D. Snyder, P. Novak-Echenique, A. Wartgow, A. Badertscher, K. O'Neill. 2019. Great Basin Ecological Site Development Project: State-and-Transition Models for Major Land Resource Area 23, Nevada and Portions of California. University

of Nevada Reno, Nevada Agricultural Experiment Station Research Report 2019-01. 605 p.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial, deep-rooted bunchgrass**			3531-4287	
	basin wildrye	LECI4	*Leymus cinereus*	3278-3783	–
	Sandberg bluegrass	POSE	*Poa secunda*	252-504	–
2	**Perennial, rhizomatous**			252-504	
	beardless wildrye	LETR5	*Leymus triticoides*	252-504	–
3	**Other Perennial Grass/Grasslikes**			0-504	
	squirreltail	ELEL5	*Elymus elymoides*	0-252	–
	sedge	CAREX	*Carex*	0-252	–
	rush	JUNCU	*Juncus*	0-252	–
Forb					
4	**Perennial Forbs**			202-404	
	silver cinquefoil	POAR8	*Potentilla argentea*	50-101	–
	common yarrow	ACMI2	*Achillea millefolium*	50-101	–
	larkspur	DELPH	*Delphinium*	50-101	–
	buttercup	RANUN	*Ranunculus*	50-101	–
5	**Other Forbs**			0-252	
	ragwort	SENEC	*Senecio*	0-50	–
	clover	TRIFO	*Trifolium*	0-50	–
	povertyweed	IVAX	*Iva axillaris*	0-50	–
	lupine	LUPIN	*Lupinus*	0-50	–
Shrub/Vine					
6	**Shrubs**			252-504	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	252-504	–
7	**Other Shrubs**			0-252	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0-50	–
	rose	ROSA5	*Rosa*	0-50	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0-50	–
	willow	SALIX	*Salix*	0-50	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Livestock/Wildlife Grazing Interpretations: Basin wildrye is valuable forage for livestock (Ganskopp et al. 2007) and wildlife, but is intolerant of heavy, repeated, or spring grazing (Krall et al. 1971). Basin wildrye is used often as a winter feed for livestock and wildlife; not only providing roughage above the snow but also cover in the early spring months (Majerus 1992). Overgrazing leads to an increase in big sagebrush, rabbitbrush and black greasewood and a decline in understory plants like basin wildrye and Nevada bluegrass (Poa sp.). Reduced bunchgrass vigor or density provides an opportunity for creeping wildrye and/or povertyweed and other invasive species to occupy interspaces. Creeping wildrye, so named due to its rhizomatous rooting characteristic, is tolerant of grazing and increases under grazing pressure (USDA 1988). During settlement, many of the cattle in the Great Basin were wintered on extensive basin wildrye stands, however due to sensitivity to spring use many stands were decimated by early in the 20th century (Young et al. 1975). Less palatable species increased in dominance along with invasive non-native/weedy species such as povertyweed, Russian thistle, mustards and cheatgrass (Roundy 1985). Spring defoliation of basin wildrye and/or consistent, heavy grazing during the growing season has been found to significantly reduce basin wildrye production and density (Krall et al. 1971). Thus, inadequate rest and recovery from defoliation can cause a decrease in basin wildrye and an increase in rabbitbrush and non-native weeds (Young et al. 1975, Roundy 1985). Additionally, natural Great Basin wildrye seed viability has been found to be low and seedlings lack vigor (Young and Evans 1981). Roundy (1985) found that although basin wildrye is adapted to seasonally dry saline soils, high and frequent spring precipitation is necessary to establish it from seed suggesting that establishment of natural basin wildrye seedlings occurs only during years of unusually high precipitation. Therefore, reestablishment of a stand that has been decimated by grazing may be episodic. Nevada bluegrass is an important forage source because it is one of the first grasses to resume growth in the spring and is palatable. The grass rates as excellent forage for cattle and horses, good to excellent for sheep, good for elk and fair to good for deer. This grass, with the exception of Sandberg bluegrass, is the most drought tolerant of the bluegrasses. Remarkably deep, extensive, and fibrous roots enable this plant to grow on rather dry sites and to endure extended droughts. Unlike the related Sandberg bluegrass, this plant succumbs to heavy grazing and trampling and has been reduced in extent on many western ranges due to over-utilization. (USDA 1988). Basin big sagebrush/basin wildrye communities provide cover and food for large ungulates, upland game birds, and smaller wildlife. Because of its tall, heavy growth, basin wildrye provides forage for elk (Cervus canadensis) and other big game in the winter when snow cover is more than two feet (Plummer et al. 1968). Wild ungulates use basin big sagebrush for cover and feed. Mule deer, pronghorn (Antilocarpra americana) and elk will browse basin big sagebrush from autumn through early spring (Wambolt et al. 1994). Early and midseral basin big sagebrush provide forage and protection from predators for mule deer (Wildlife Action Plan Team 2012). Mule deer preference for the shrub varies seasonally. Basin big sagebrush was used more by mule deer populations in Oregon and Utah in winter than by the same populations in fall. (Sheehy and Winward 1981, Welch et al. 1981) This could be because basin big sagebrush is consumed as a last resort plant and browsed when plants considered more palatable were no longer available (Welch et al. 1981). Elk and pronghorn antelope will browse basin big sagebrush in areas where mountain and Wyoming sagebrush are unavailable (Beale and Smith 1970, Wambolt 1996). Basin big sagebrush serves as valuable habitat for native birds. Studies have suggested that sage grouse use basin big sagebrush for cover and food where mountain and Wyoming big sagebrush are absent (Welch et al. 1991). Birds such as Brewer’s sparrows (Spizella breweri) are considered dependent on sagebrush communities for cover and will nest in basin big sagebrush. Thus when basin big sagebrush communities are converted to agriculture fields, Brewer’s sparrow populations can decline due to loss of habitat (Knick et al. 2003). In fact, mature basin big sagebrush act as nesting structures, protection from predators and thermal cover for Greater sage grouse (Centrocercus urophasianus), the loggerhead shrike (Lanius ludovicianus), the sage sparrow (Artemisiospiza nevadensis), Brewer’s sparrow and sage thrasher (Oreoscoptes montanus) (Wildlife Action Plan Team 2012). The plant also acts as important cover for game-birds such as the gray partridge (Perdix perdix), mountain quail (Oreotyx pictus), and mourning doves (Zenaida macroura), as well as passerines such as, towhees (Pipilo spp.) and finches (Haemorhous spp.), that occur on arid range lands in the West (Dobbs et al. 2012, Booth 1985). Changes in plant community composition caused by, human activity, invasive weeds, fire frequency associated with this ecological site could affect the distribution and presence of wildlife species.

Hydrological functions

The soils of this site have medium infiltration rates and low runoff potential. The hydrologic soil groups are B and C.

Recreational uses

This site offers great potential for deer and upland game bird hunting, as well as fishing in the associated perennial streams.

Inventory data references

Vale District BLM Ecological Site Inventory NASIS component and pedon data Range Site Descriptions Field knowledge of range-trained personnel

Other references

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Approval

Kendra Moseley, 4/10/2025

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	08/09/2012
Approved by	
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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10-25%

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 = 3-5

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Deep well drained silt loam: Moderate OM (3-5%)

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Moderate ground cover (40-60%) and gentle slopes (0-7%) 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 > other grasses > shrubs > forbs

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):** **Normal decadence and mortality expected**

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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):** **Favorable: 6000, Normal: 4500, Unfavorable: 2000 lbs/acre/year at high RSI (HCPC)**

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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:** **Perennial brush species will increase with deterioration of plant community. Cheatgrass and Medusahead invade 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**
