USDA Natural Resources
Conservation Service

Ecological site R027XY003NV
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.

MLRA notes

Major Land Resource Area (MLRA): 027X–Fallon-Lovelock Area

Physiography
Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years.
The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters).

Geology
Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA.

Climate
The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation.

Water
The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout.

Soils
The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly mesic temperature

regime, and aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum.

Biological Resources
This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey's greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

Ecological site concept

The Loamy Bottom site occurs on stream terrace remnants and axial-stream floodplains. Slope gradients range from 0 to 4 percent. Elevations are 3900 to 7500 feet. The soils associated are very deep and well to poorly-drained. Surface soils are thick and very fertile. Some soils have a seasonally high water table at depths of 30 to 60 inches which allows for significant fluctuations in herbage production. Additional moisture is received as run-in off higher landscapes.

Associated sites

R027XY058NV	**LOAMY 10-12 P.Z.**
F027XY081NV	**Shallow Rocky Loam**
R027XY032NV	**SHALLOW CALCAREOUS LOAM 10-12 P.Z.**

Similar sites

R027XY041NV	**DEEP SODIC FAN** ATTO dominant shrub; less productive site
R027XY029NV	**GRAVELLY FAN 8-10 P.Z.** Less productive site; ARTRW & GRSP codominant shrubs; ACHY & LECI4 codominant grasses
R027XY006NV	**SALINE BOTTOM** SAVE4 dominant shrub, less productive site

Table 1. Dominant plant species

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

Physiographic features

The Loamy Bottom site occurs on stream terrace remnants and axial-stream floodplains. Slope gradients range from 0 to 4 percent. Elevations are 3900 to 7500 feet.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Flood plain
Runoff class	Medium

Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare
Ponding frequency	None
Elevation	3,900–7,500 ft
Slope	0–4%
Water table depth	30–60 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 8 to about 12 inches. Mean annual air temperature is 42 to 50 degrees F. The average growing season is 90 to about 120 days. There is no climate station available for this site.

Table 3. Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	12 in

Influencing water features

This site has a seasonally high water table and recieves run-in off higher landscapes. This site is suseptable to gullying.

Soil features

The soils associated with this site are very deep and well to poorly-drained. Surface soils are thick and very fertile. The available water capacity is high to very high. Some soils have a seasonally high water table at depths of 30 to 60 inches which allows for significant fluctuations in herbage production. Additional moisture is received on this site as run-in off higher landscapes. In some areas, this site occurs where a meadow has deteriorated due to stream channel entrenchment and resultant lowering of the water table. These soils are susceptible to gullying which intercepts normal overflow patterns causing site degradation. The soils associated with this site are Tierney and Tornillo variant (mapped in MLRA 26).

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silt loam (2) Silty clay loam (3) Clay loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to well drained
Permeability class	Moderately slow
Soil depth	72–84 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	7.1–7.9 in

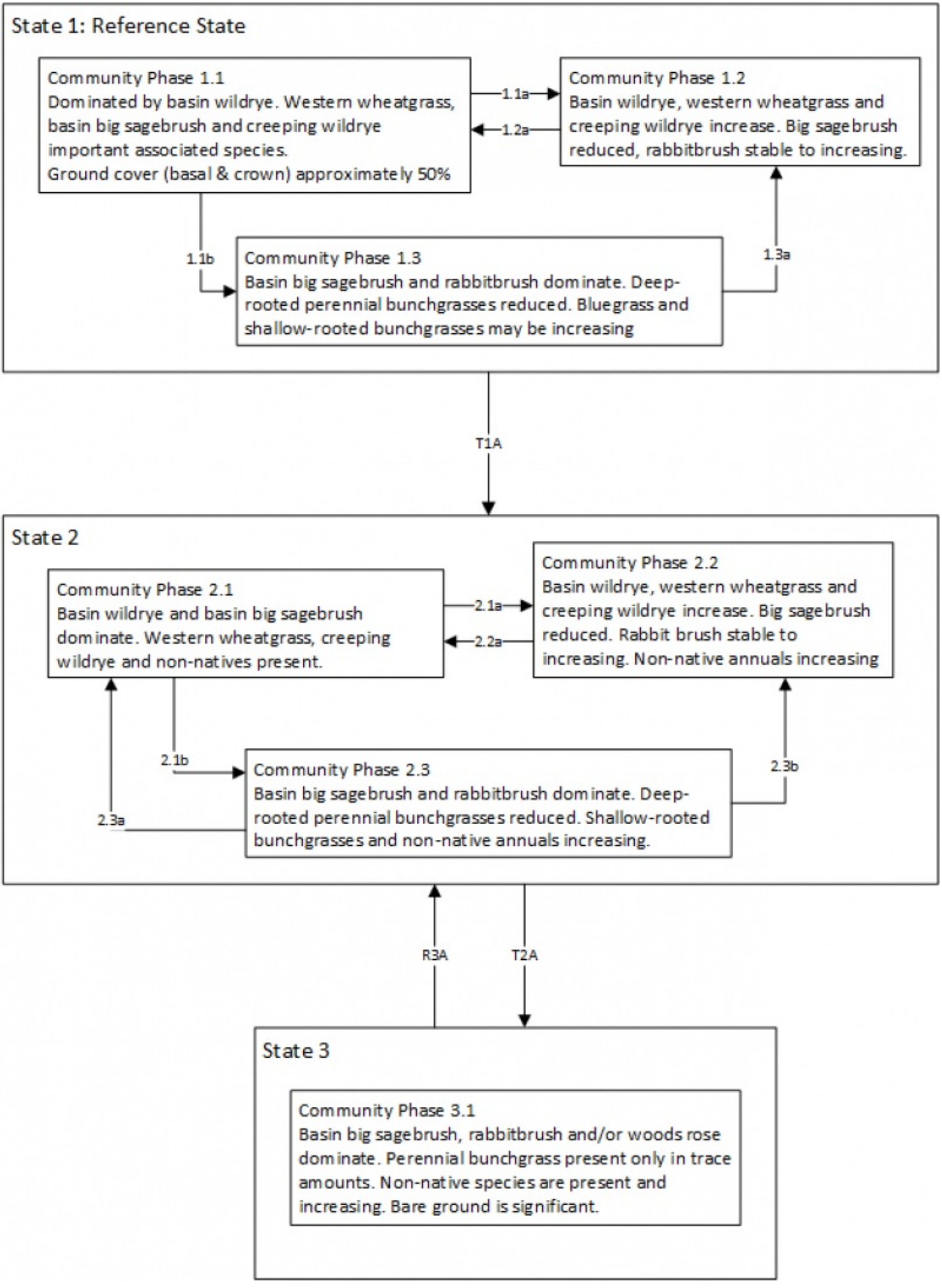
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	1–45
Soil reaction (1:1 water) (0-40in)	7.9–9.6
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

As ecological condition deteriorates, basin big sagebrush and rubber rabbitbrush become dominant as basin wildrye and other deep-rooted perennial herbaceous species decrease. As the site further deteriorates, the aspect is often dominated by rubber rabbitbrush. Cheatgrass and thistle are species likely to invade this site.

Fire Ecology:
Grassland communities with a basin wildrye component historically experienced mostly infrequent to frequent stand replacing fires. Grassland vegetation types experienced both short fire intervals of less than 35 years as well as intervals ranging from 35 to 100 years, depending on climate and ignition sources. 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. The major adaptation of western wheatgrass to fire is its rhizomatous growth form. During a fire the coarse culms usually burn fast with little or no heat transferred to the roots. Recovery takes about 2 to 5 years after a fire. Creeping wildrye is top-killed by fire. Creeping wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.
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.

State and transition model


State 1: Reference State
Community Phase 1.1
Dominated by basin wildrye. Western wheatgrass, basin big sagebrush and creeping wildrye important associated species.
Ground cover (basal & crown) approximately 50%
1.1a
1.2a
Community Phase 1.2
Basin wildrye, western wheatgrass and creeping wildrye increase. Big sagebrush reduced, rabbitbrush stable to increasing.
1.1b
Community Phase 1.3
Basin big sagebrush and rabbitbrush dominate. Deep-rooted perennial bunchgrasses reduced. Bluegrass and shallow-rooted bunchgrasses may be increasing
1.3a
T1A
State 2
Community Phase 2.1
Basin wildrye and basin big sagebrush dominate. Western wheatgrass, creeping wildrye and non-natives present.
2.1a
2.2a
Community Phase 2.2
Basin wildrye, western wheatgrass and creeping wildrye increase. Big sagebrush reduced. Rabbit brush stable to increasing. Non-native annuals increasing
2.1b
Community Phase 2.3
Basin big sagebrush and rabbitbrush dominate. Deep-rooted perennial bunchgrasses reduced. Shallow-rooted bunchgrasses and non-native annuals increasing.
2.3b
2.3a
R3A
T2A
State 3
Community Phase 3.1
Basin big sagebrush, rabbitbrush and/or woods rose dominate. Perennial bunchgrass present only in trace amounts. Non-native species are present and increasing. Bare ground is significant.

Reference State 1.0
State 1: The reference state is represented of the natural range of variability under natural conditions. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack.
CP 1.1: This community is characterized by basin wildrye, with a lesser component of basin big sagebrush. Western wheatgrass and creeping wildrye are important associated species. This site is tolerant of dry conditions, but prolonged drought will result in an overall decline, with possible mortality, in the plant community.
1.1a: Fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and sprouting shrubs.
1.1b: Time, lack of disturbance, and/or prolonged drought
CP 1.2: This community phase is characteristic of a post-disturbance plant community. Basin big sagebrush and other shrubs are reduced. Herbaceous perennials and sprouting shrubs will recover quickly.
1.2a: Time and lack of disturbance allow for shrub regeneration.
CP 1.3: This community phase is characterized by a decadent overstory of basin big sagebrush. Basin wildrye and other deep-rooted perennial bunchgrasses are reduced due to competition for water, nutrients and sunlight. This community phase is at-rick of crossing a threshold into an alternative stable site.
1.3a: Low severity/patchy fire, Aroga moth, or combinations will reduce big sagebrush and for recovery of deep-rooted perennial bunchgrass species.
1.3b: Widespread fire significantly reduces sagebrush cover

Transition T1A: Introduction of non-native species such as cheatgrass, hoary cress and thistles.
Current Potential State 2.0: This state is similar to the reference state, with the presence of non-native species in the plant community. Non-native species reduce resistance and resilience of the site, but are not controlling ecological dynamics.

CP 2.1: This community phase is similar to CP 1.1. It is dominated by basin wildrye with the presence of non-native species in the understory.
2.1a: Fire significantly reduces sagebrush cover and leads to earl-seral community dominated by grasses and forbs.
2.1b: Time and lack of disturbance such as fire, drought, and/or Inappropriate grazing management will reduce perennial understory and favor shrub overstory.
CP 2.2: This community is characterized by dominance of perennial bunchgrasses. Shrubs are reduced, non-native species are present and may be increasing.
2.2a: Time, lack of disturbance and natural regeneration over time allows for recovery of sagebrush
2.3a: Low severity/patchy fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; latefall/ winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A: Time and lack of disturbance, may be coupled with inappropriate grazing management and/or hydrologic changes that favor shrubs over
perennial grasses. (3.1).
Shrub state 3.0 is characterized by the dominance of basin big sagebrush. Basin wildrye and other perennial bunchgrasses are significantly reduced and are not contributing to ecological function. Distribution of water and nutrient resources are spatially truncated due to the dominance of shrubs.

Restoration Pathway R3A: Mechanical/chemical brush treatment coupled with herbicide. Gully plugs or other hydrologic modifiers may be necessary to restore hydrologic function.

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by basin wildrye. Basin big sagebrush may be prevalent enough to dominate the visual aspect. Potential vegetative composition is about 80% grasses, 5% forbs and 15% shrubs. Approximate ground cover (basal and crown) is 60 to 70 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2000	3200	4800
Shrub/Vine	375	600	900
Forb	125	200	300
Total	**2500**	**4000**	**6000**

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	**Primary Perennial Grasses**			3200–4800	
	basin wildrye	LECI4	*Leymus cinereus*	2800–3600	–
	beardless wildrye	LETR5	*Leymus triticoides*	200–600	–
	western wheatgrass	PASM	*Pascopyrum smithii*	200–600	–
2	**Secondary Perennial Grasses**			80–320	
	sedge	CAREX	*Carex*	20–120	–
	alkali sacaton	SPAI	*Sporobolus airoides*	20–120	–
Forb					
3	**Perennial**			80–320	
	aster	ASTER	*Aster*	20–80	–
	lupine	LUPIN	*Lupinus*	20–80	–
	ragwort	SENEC	*Senecio*	20–80	–
Shrub/Vine					
4	**Primary Perennial Shrubs**			200–400	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	200–400	–
5	**Secondary Perennial Shrubs**			80–320	
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	20–120	–
	desert peach	PRAN2	*Prunus andersonii*	20–120	–
	currant	RIBES	*Ribes*	20–120	–
	Woods' rose	ROWO	*Rosa woodsii*	20–120	–

Animal community

Livestock Interpretations:
This site is suited for livestock grazing. Grazing managment should be keyed to basin wildrye and all other perennial grass species. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. Western wheatgrass provides important forage for domestic sheep. Fall regrowth cures well on the stem, so western wheatgrass is good winter forage for domestic livestock. Creeping wildrye can be used for forage and is very palatable to all livestock. Once established it is very rhizomatous and maintains stands for many years. Basin big sagebrush may serve as emergency food during severe winter weather, but it is not usually sought out by livestock.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

Wildlife Interpretations:
Basin big sagebrush is the least palatable of all the subspecies of big sagebrush. Basin big sagebrush is browsed by mule deer from fall to early spring, but is not preferred. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses. Creeping wildrye is used for forage for many wildlife species and is often used for cover.

Hydrological functions

Runoff is medium.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

Some Native Americans used the bark of big sagebrush to make rope and baskets. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed. Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment. Western wheatgrass is a good soil binder and is well suited for reclamation of disturbed sites such as erosion control and soil stabilization. Creeping wildrye is primarily used for reclamation of wet, saline soils.

Inventory data references

NASIS data used for abiotic site ranges.

Type locality

Location 1: Churchill County, NV	
General legal description	This site also occurs in Lyon County, Nevada.

Other references

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov

Hood, Sharon M.; Miller, Melanie, editors. 2007. Fire Ecology and Management of the Major Ecosystems of Southern Utah. Gen. Tech. Rep. RMRS-GTR-202. Fort Collins, CO: U.S. Department of agriculture, Forest Service, Rocky Mountain Research Station. 110p.

Contributors

GD/GKB

Approval

Kendra Moseley, 6/03/2024

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)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	07/19/2013
Approved by	Kendra Moseley
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):** Bare Ground ± 20%

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage of grasses and annual & perennial forbs) only expected to move during periods of flooding by adjacent streams. Persistent litter (large woody material) will remain in place except during large flooding events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of**

values): Soil stability values will range from 4 to 6. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is platy or granular. Soil surface colors are very dark and the soils have thick mollic epipedons. Organic matter can range from 2 to 3 percent for much of the upper 20 inches.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted, perennial, bunchgrasses slow runoff and increase infiltration. Tall stature and relatively coarse foliage of basin wildrye and associated litter break raindrop impact and provide opportunity for snow catch and snow accumulation on site.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None - Platy subsurface layers are not to be interpreted as compaction.

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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: Tall-statured, deep-rooted, cool season, perennial bunchgrasses

    Sub-dominant: rhizomatous, cool season, perennial grasses > tall shrubs > deep-rooted, cool season, perennial bunchgrasses and grasslike plants > deep-rooted perennial forbs = associated shrubs

    Other: warm season perennial bunchgrasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common; standing dead shrub canopy material may be as much as 25% of total woody canopy.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (± 80%) and litter depth is < 1 inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through June) ± 4000 lbs/ac; Favorable years ± 6000 lbs/ac and unfavorable years ± 2500 lbs/ac. Winter moisture significantly affects total production

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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:** Potential invaders include annual mustards, thistle, annual kochia, pigweed, tall whitetop and

salt cedar.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in most years.
