USDA Natural Resources
Conservation Service

Ecological site R025XY050NV
STONY BOTTOM

Accessed: 05/20/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 025X–Owyhee High Plateau

MLRA 25 lies within the Intermontane Plateaus physiographic province. The southern half is in the Great Basin Section of the Basin and Range Province. This part of the MLRA is characterized by isolated, uplifted fault-block mountain ranges separated by narrow, aggraded desert plains. This geologically older terrain has been dissected by numerous streams draining to the Humboldt River. The northern half of the area lies within the Columbia Plateaus geologic province. This part of the MLRA forms the southern boundary of the extensive Columbia Plateau basalt flows. Deep, narrow canyons drain to the Snake River which incise the broad volcanic plain. The Humboldt River, route of a major western pioneer trail, crosses the southern half of this area. Reaches of the Owyhee River in this area have been designated as National Wild and Scenic Rivers.
Nevada’s climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada’s climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State.

Ecological site concept

This site occurs in drainage ways and small depressional areas within upland landscapes. Slopes range from 0 to 8 percent, but slope gradients of 2 to 4 percent are most typical. Elevations are 5000 to 5500 feet.

The soils associated with this site have a shallow effective rooting depth. Surface soils are modified by high amounts of cobbles and stones which occupy plant growing space. Additional moisture is received as run-in from higher landscapes.

The reference plant community is dominated by bluebunch wheatgrass. Grasses dominate the aspect. Potential vegetative composition is about 90% grasses, and 10% forbs. Approximate ground cover (basal and crown) is 20 to 40 percent.

Associated sites

R025XY019NV	**LOAMY 8-10 P.Z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pseudoroegneria spicata subsp. spicata*

Physiographic features

This site occurs in drainage ways and small depressional areas within upland landscapes. Slopes range from 0 to 8 percent, but slope gradients of 2 to 4 percent are most typical. Elevations are 5000 to 5500 feet.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Depression
Elevation	1,524–1,676 m
Slope	0–8%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, dry summers.
The average annual precipitation ranges from 8 to 10 inches. Mean annual air temperature is about 45 to 50 degrees F.
Mean annual precipitation across the range in which this ES occurs is 9.85".

Monthly mean precipitation: January 1.00”; February 0.72”; March 0.87”; April 0.79”; May 1.32”; June 1.06”; July 0.47”; August 0.53”; September 0.59”; October 0.70”; November 0.84”; December 0.96”.

*The above data is averaged from the Elko AP and Contact WRCC climate stations.

Table 3. Representative climatic features

Frost-free period (average)	74 days
Freeze-free period (average)	105 days
Precipitation total (average)	279 mm

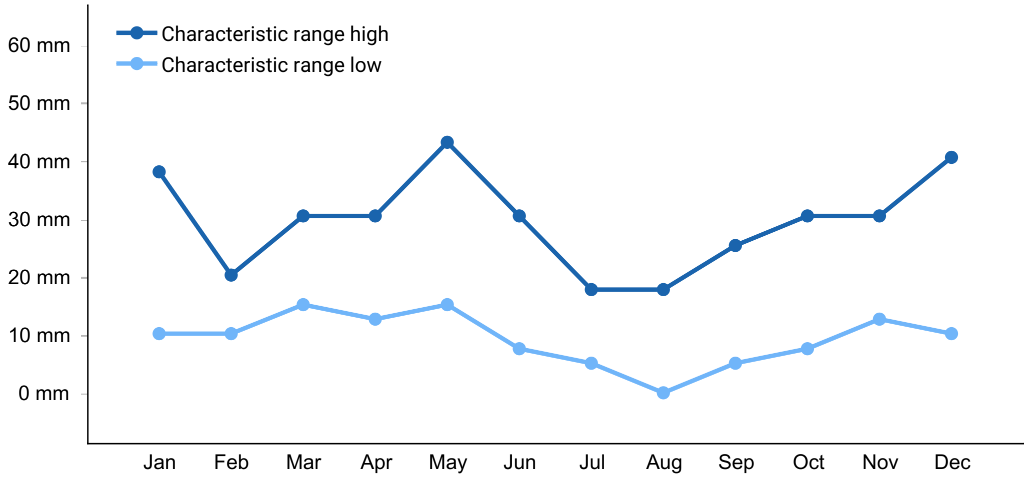


Figure 1. Monthly precipitation range

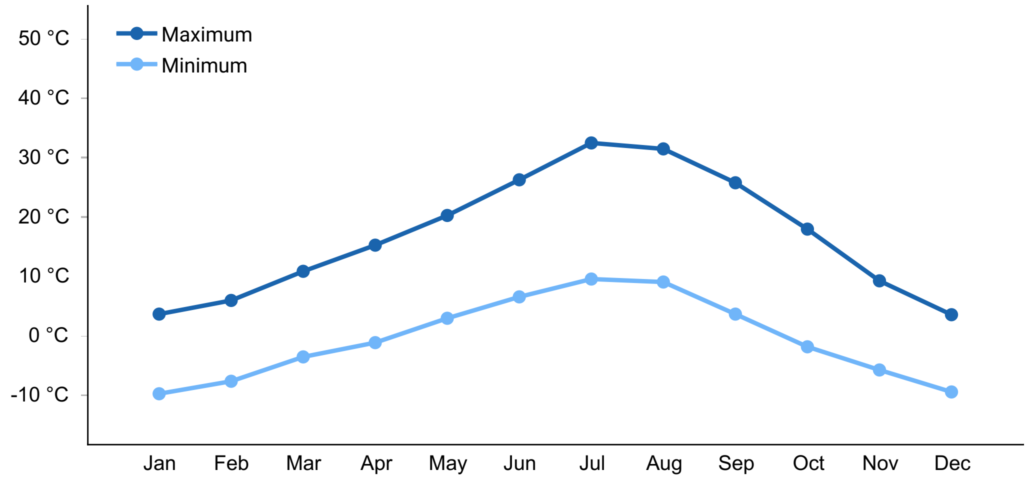


Figure 2. Monthly average minimum and maximum temperature

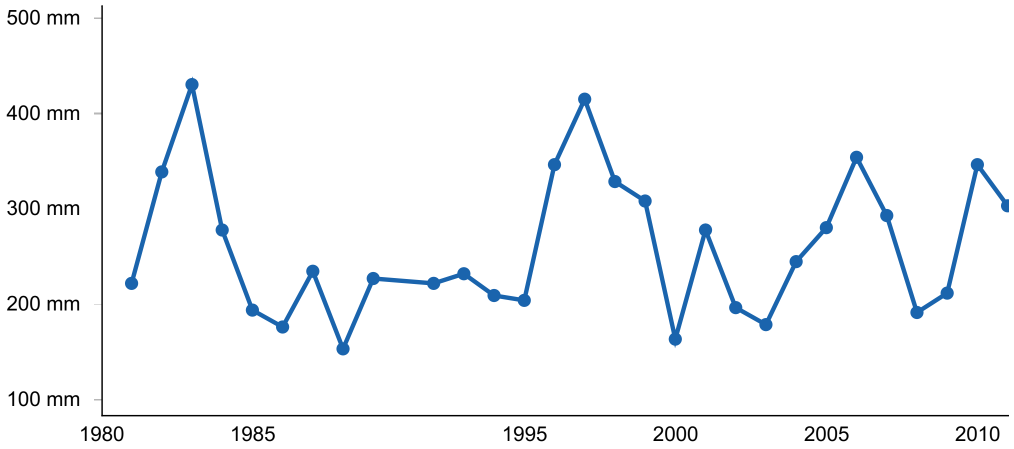


Figure 3. Annual precipitation pattern

Climate stations used

- (1) CONTACT [USC00261905], Jackpot, NV
- (2) ELKO RGNL AP [USW00024121], Elko, NV

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site have a shallow effective rooting depth. Surface soils are modified by high amounts of cobbles and stones which occupy plant growing space. Additional moisture is received as run-in from higher landscapes.

Ecological dynamics

An ecological site is the product of all the environmental factors responsible for its development and has a set of key characteristics that influence a site's resilience to disturbance and resistance to invasives. Key characteristics include 1) climate (precipitation and temperature), 2) topography (aspect, slope, elevation, and landform), 3) hydrology (infiltration and runoff), 4) soils (depth, texture, structure, and organic matter), 5) plant communities (functional groups and productivity), and 6) natural disturbance regime (fire, herbivory, etc.) (Caudle et al. 2013). Biotic factors that influence resilience include site productivity, species composition and structure, as well as population regulation and regeneration (Chambers et al. 2013).

This ecological site is dominated by deep-rooted cool season, perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. The dominant shrubs usually root to the full depth of the winter-spring soil moisture recharge, which ranges from 1.0 to over 3.0 meters (Comstock and Ehleringer 1992). Root length of mature sagebrush plants was measured to a depth of 2 meters in alluvial soils in Utah (Richards and

Caldwell 1987). These shrubs have a flexible generalized root system with development of both deep taproots and laterals near the surface (Dobrowolski et al. 1990).

In the Great Basin, the majority of annual precipitation is received during the winter and early spring. This continental semiarid climate regime favors growth and development of deep-rooted shrubs and herbaceous cool season plants using the C3 photosynthetic pathway (Comstock and Ehleringer 1992). Winter precipitation and slow melting of snow results in deeper percolation of moisture into the soil profile. Herbaceous plants, more shallow-rooted than shrubs, grow earlier in the growing season and thrive on spring rains, while deeper-rooted shrubs lag in phenological development because they draw from deeply infiltrating moisture in snowmelt from the previous winter. P

Periodic drought regularly influences sagebrush ecosystems and drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity can be altered by the timing of precipitation and water availability within the soil profile (Bates et al 2006).

Variability in plant community composition and production depends on soil surface texture and depth. For example, Thurber’s needlegrass will increase on gravelly soils, whereas Indian ricegrass will increase with sandy soil surfaces, and bottlebrush squirreltail will increase with silty soil surfaces. A weak argillic horizon will promote production of bluebunch wheatgrass. Production generally increases with soil depth. The amount of sagebrush in the plant community is dependent upon disturbances such as fire, Aroga moth infestations, and grazing. Sandberg bluegrass more easily dominates sites where surface soils are gravelly loams or when there is an increase in ash in the upper soil profile.

Wyoming big sagebrush is the most drought tolerant of the big sagebrushes and is generally long-lived, deeming it unnecessary for new individuals to recruit every year for perpetuation of the stand. Simultaneous low, continuous recruitment and infrequent large recruitment events are the foundation of population maintenance (Noy-Meir 1973). Survival of the seedlings is dependent on adequate moisture conditions.

Native insect outbreaks are also important drivers of ecosystem dynamics in sagebrush communities. Climate is generally believed to influence the timing of insect outbreaks, especially with regard to Aroga moth (Aroga websteri), a sagebrush defoliator. Aroga moth infestations have occurred in the Great Basin in the 1960s, early 1970s, and have been ongoing in Nevada since 2004 (Bentz, et al 2008). Thousands of acres of big sagebrush have been impacted, with partial to complete die-off of plants or entire stands of big sagebrush observed(Furniss and Barr 1975).

Perennial bunchgrasses generally have shallower root systems than shrubs in these systems, but root densities are often as high as or higher than those of shrubs in the upper 0.5 m but taper off more rapidly than shrubs. General differences in root depth distributions between grasses and shrubs result in resource partitioning in these shrub/grass systems.

The Great Basin sagebrush communities have high spatial and temporal variability in precipitation, both among years and within growing seasons. Nutrient availability is typically low but increases with elevation and closely follows moisture availability. The moisture resource supporting the greatest amount of plant growth is usually the water stored in the soil profile during winter. The invasibility of plant communities is often linked to resource availability. Disturbance can decrease resource uptake due to damage or mortality of the native species and depressed competition. It can also increase resource pools via the decomposition of dead plant material following disturbance. The invasion of sagebrush communities by cheatgrass (Bromus tectorum) has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al. 2007).

The introduction of annual weedy species, such as cheatgrass, may cause an increase in fire frequency and eventually lead to an annual state. Conversely, as fire frequency decreases, sagebrush will increase and with inappropriate grazing management, perennial bunchgrasses and forbs may be reduced.

As ecological condition declines, bluebunch wheatgrass and other deep-rooted perennial grasses decrease while phlox, bottlebrush squirreltail and Sandberg's bluegrass increase. In lower condition classes, forb species (especially annual forbs) often become dominant on the site.

This ecological site has low resilience to disturbance and low resistance to invasion. Increased resilience increases with elevation, aspect, increased precipitation and increased nutrient availability.

Fire Ecology:
Bluebunch wheatgrass communities' fire return intervals tend to be less than 30 years; however they can be highly variable ranging up to 100 years, depending on the location. Burning bluebunch wheatgrass may remove most of the aboveground biomass but does not usually result in plant mortality. Bluebunch wheatgrass is generally favored by burning. Burning stimulates flowering and seed production. However, season of burning affects mortality.

The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses within the site along with seasonality and intensity of the fire are factors in individual species' responses. For most forbs and grasses, the growing points are located at or below the soil surface providing relative protection from disturbances which decrease above ground biomass, such as grazing or fire. Thus, fire mortality is more correlated to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Wright 1971, Young 1983).

Fire will remove aboveground biomass from bluebunch wheatgrass but plant mortality is generally low (Robberecht and Defossé 1995) because the buds are underground (Conrad and Poulton 1966) or protected by foliage. Uresk et al. (1976) reported burning increased vegetative and reproductive vigor of bluebunch wheatgrass. Thus, bluebunch wheatgrass is considered to experience slight damage to fire but is more susceptible in drought years (Young 1983). Plant response will vary depending on season, fire severity, fire intensity and post-fire soil moisture availability.

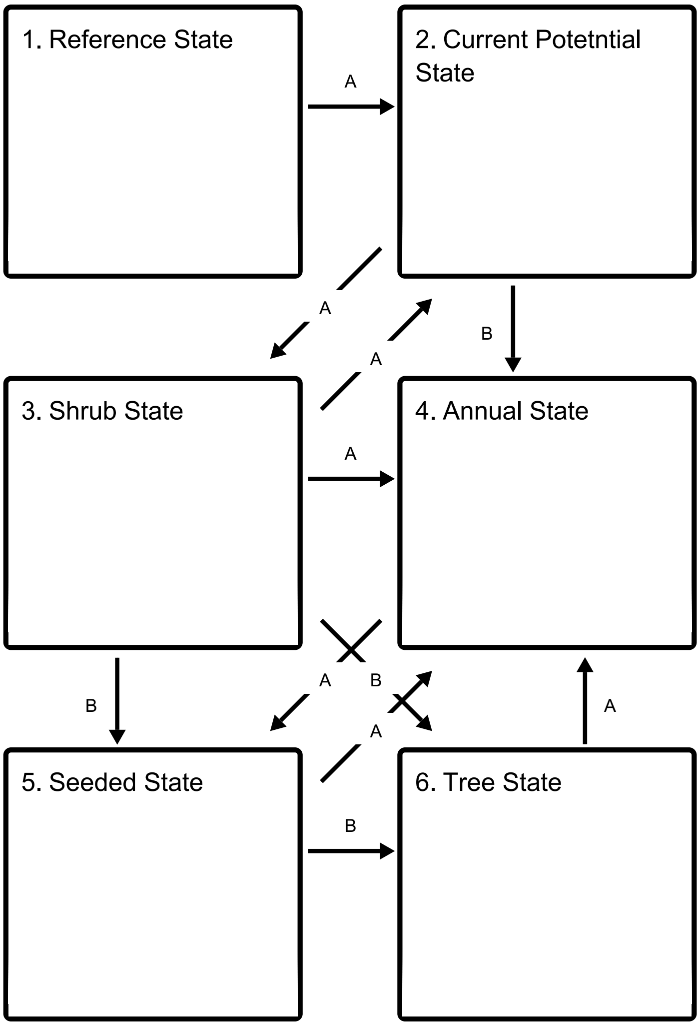
Burning has been found to decrease the vegetative and reproductive vigor of Thurber's needlegrass (Uresk et al. 1976). Fire can cause high mortality and a reduction in the basal area and yield of Thurber's needlegrass (Britton et al. 1990). The fine leaves and densely tufted growth form make this grass susceptible to subsurface charring of the crowns (Wright and Klemmedson 1965). Although timing of fire highly influences the response and mortality of Thurber's needlegrass, smaller bunch sizes are less likely to be damaged by fire (Wright and Klemmedson 1965). Thurber's needlegrass often survives fire and will continue growth or regenerate from tillers when conditions are favorable (Koniak 1985, Britton et al. 1990). Reestablishment on burned sites has been found to be relatively slow due to low germination and competitive ability (Koniak 1985). Cheatgrass has been found to be a highly successful competitor with seedlings of this needlegrass and may preclude reestablishment (Evans and Young 1978).

Sandberg bluegrass, a minor component of this ecological site, has been found to increase following fire likely due to its low stature and productivity (Daubenmire 1975). Sandberg bluegrass may retard reestablishment of deeper-rooted bunchgrasses. Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species to occupy interspaces, leading to increased fire frequency and potentially an annual plant community.

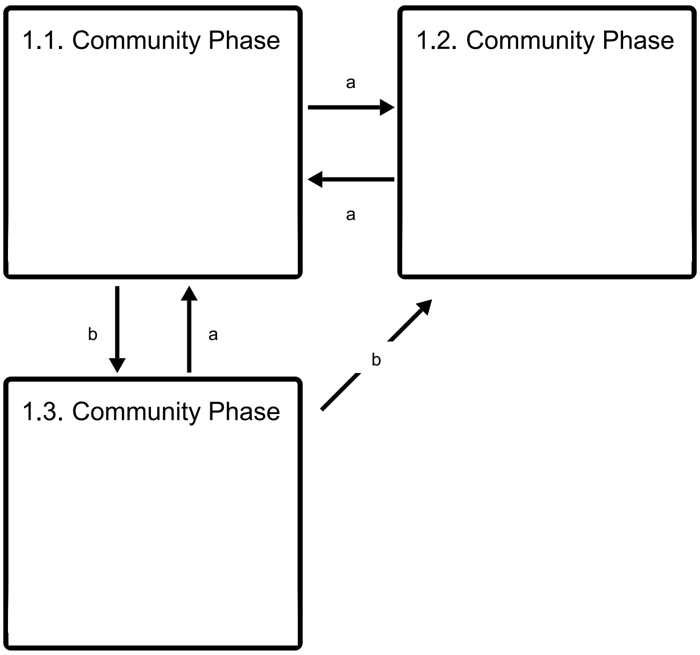
Depending on fire severity, rabbitbrush and horsebrush may increase after fire. Rubber rabbitbrush is top-killed by fire, but can resprout after fire and can also establish from seed (Young 1983). Yellow rabbitbrush is top-killed by fire, but sprouts vigorously after fire (Kuntz 1982, Akinsoji 1988). As cheatgrass increases, fire frequencies also increase to between 0.23 and 0.43 times a year; at this rate, even sprouting shrubs such as rabbitbrush will not survive (Whisenant 1990).

State and transition model

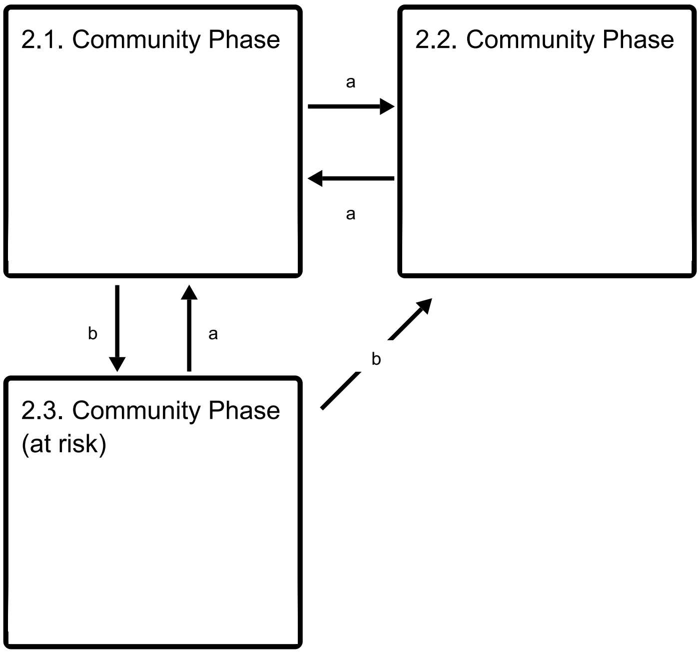
Ecosystem states



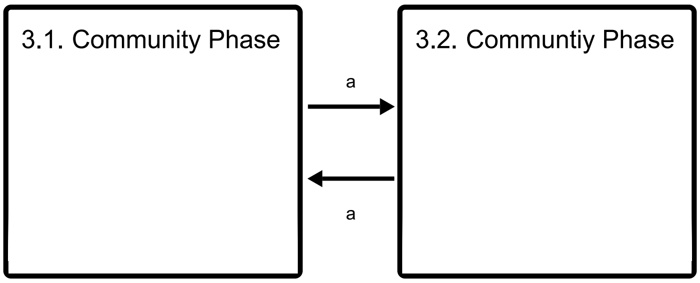
State 1 submodel, plant communities



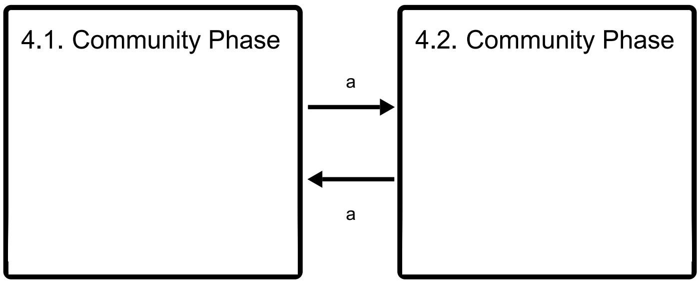
State 2 submodel, plant communities



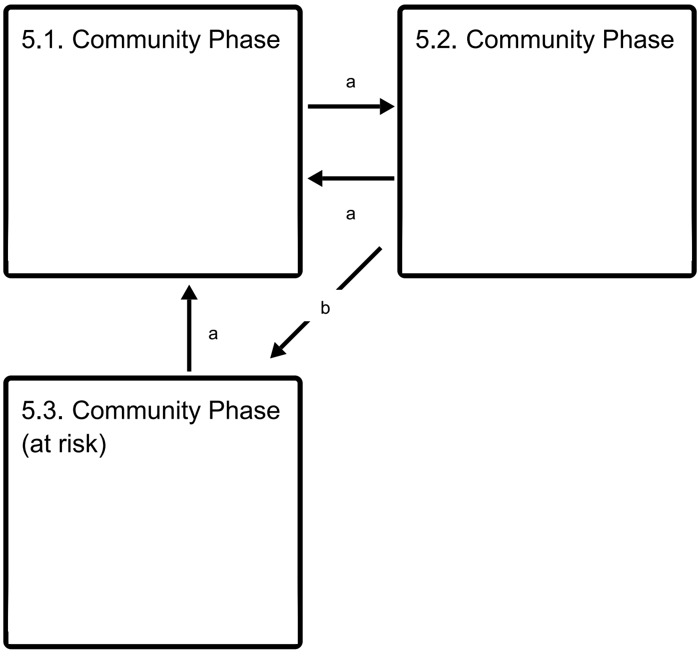
State 3 submodel, plant communities



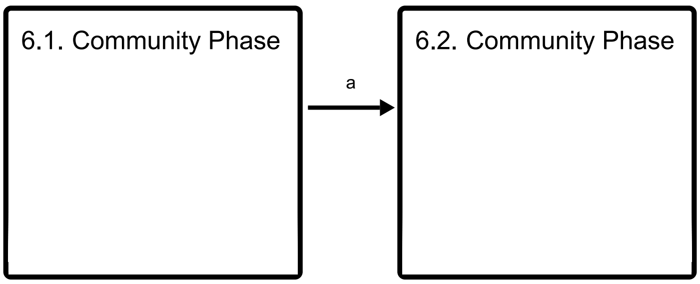
State 4 submodel, plant communities



State 5 submodel, plant communities



State 6 submodel, plant communities



State 1
Reference State

The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. The reference state has three general community phases; a shrub-grass dominant phase, a perennial grass dominant phase and a shrub dominant phase. 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.

Community 1.1
Community Phase

The reference plant community is dominated by bluebunch wheatgrass. Grasses dominate the aspect. Potential vegetative composition is about 90% grasses, and 10% forbs. Approximate ground cover (basal and crown) is 20 to 40 percent.

Table 4. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	112	168	280
Grass/Grasslike	90	135	224
Forb	22	34	56
Total	**224**	**337**	**560**

Community 1.2
Community Phase

Community 1.3
Community Phase

Pathway a
Community 1.1 to 1.2

Pathway b
Community 1.1 to 1.3

Pathway a
Community 1.2 to 1.1

Pathway a
Community 1.3 to 1.1

Pathway b
Community 1.3 to 1.2

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State 2
Current Potetntial State

Community 2.1
Community Phase

Community 2.2
Community Phase

Community 2.3

Community Phase (at risk)

Pathway a
Community 2.1 to 2.2

Pathway b
Community 2.1 to 2.3

Pathway a
Community 2.2 to 2.1

Pathway a
Community 2.3 to 2.1

Pathway b
Community 2.3 to 2.2

State 3
Shrub State

Community 3.1
Community Phase

Community 3.2
Communtiy Phase

Sandberg bluegrass dominates the understory; annual non-natives are present but are not dominant. Trace amounts of sagebrush may be present. Rabbitbrush may dominate for a number of years following fire.

Pathway a
Community 3.1 to 3.2

Pathway a
Community 3.2 to 3.1

Absence of disturbance over time would allow for sagebrush and other shrubs to recover.

State 4
Annual State

Community 4.1

Community Phase

Community 4.2
Community Phase

Pathway a
Community 4.1 to 4.2

Pathway a
Community 4.2 to 4.1

State 5
Seeded State

Community 5.1
Community Phase

Community 5.2
Community Phase

Community 5.3
Community Phase (at risk)

Sagebrush becomes the dominant plant. Perennial bunchgrasses in the understory are reduced due to increased competition. Annual non-native species may be increasing. Utah juniper may be present.

Pathway a
Community 5.1 to 5.2

Pathway a
Community 5.2 to 5.1

Pathway b
Community 5.2 to 5.3

Pathway a
Community 5.3 to 5.1

Fire or brush management with minimal soil disturbance would reduce sagebrush to trace amounts and allow for the perennial understory to increase.

State 6
Tree State

Community 6.1
Community Phase

Community 6.2
Community Phase

Pathway a
Community 6.1 to 6.2

Transition A
State 1 to 2

Transition A
State 2 to 3

Transition B
State 2 to 4

Restoration pathway A
State 3 to 2

Transition A
State 3 to 4

Restoration pathway B
State 3 to 5

Transition B
State 3 to 6

Restoration pathway A
State 4 to 5

Transition A
State 5 to 4

Transition B
State 5 to 6

Transition A
State 6 to 4

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			511–673	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	471–538	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	13–67	–
	Webber needlegrass	ACWE3	*Achnatherum webberi*	13–34	–
	sedge	CAREX	*Carex*	13–34	–
2	**Secondary Perennial Grasses**			13–54	
	onespike danthonia	DAUN	*Danthonia unispicata*	3–20	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	3–20	–
	basin wildrye	LECI4	*Leymus cinereus*	3–20	–
	Sandberg bluegrass	POSE	*Poa secunda*	3–20	–
Forb					
3	**Perennial Forbs**			34–101	
	sedge	CAREX	*Carex*	13–34	–
	aster	ASTER	*Aster*	3–20	–
	milkvetch	ASTRA	*Astragalus*	3–20	–
	Hooker's balsamroot	BAHO	*Balsamorhiza hookeri*	3–20	–
	matted buckwheat	ERCA8	*Eriogonum caespitosum*	3–20	–
	lupine	LUPIN	*Lupinus*	3–20	–
	evening primrose	OENOT	*Oenothera*	3–20	–
	beardtongue	PENST	*Penstemon*	3–20	–
	phlox	PHLOX	*Phlox*	3–20	–
Shrub/Vine					
4	**Shrubs**			1–20	
	yellow rabbitbrush	CHVIP4	*Chrysothamnus viscidiflorus ssp. puberulus*	3–7	–

Animal community

Livestock Interpretations:
This site is suited for livestock grazing. Grazing management should be keyed to Bluebunch wheatgrass. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species.

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:
Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for wildlife. Bluebunch wheatgrass does not generally provide sufficient cover for ungulates, however, mule deer were frequently found in bluebunch-dominated grasslands.

Overgrazing leads to an increase in sagebrush and a decline in understory plants like bluebunch wheatgrass and Thurber’s needlegrass. Squirreltail or Sandberg bluegrass will increase temporarily with further degradation. Invasion of annual weedy forbs and cheatgrass could occur with further grazing degradation, leading to a decline in squirreltail and bluegrass and an increase in bare ground. A combination of overgrazing and prolonged drought leads to soil erosion, increased bare ground and a loss in plant production. Wildfire in sites with cheatgrass present could transition to cheatgrass-dominated communities. Without management, cheatgrass and annual forbs are likely to invade and dominate the site, especially after fire. Although trees are not part of the site concept, Utah juniper and/or singleleaf pinyon can also invade and eventually dominate this site.
Thurber's needlegrass is an important forage source for livestock and wildlife in the arid regions of the west (Ganskopp 1988). Although the seeds are not injurious, grazing animals avoid them when they begin to mature. Sheep, however, have been observed to graze the leaves closely, leaving stems untouched (Eckert and Spencer 1987). Heavy grazing during the growing season has been shown to reduce the basal area of Thurber’s needlegrass (Eckert and Spencer 1987), suggesting that both seasonality and utilization are important factors in management of this plant. A single defoliation, particularly during the boot stage, was found to reduce herbage production and root mass thus potentially lowering the competitive ability of Thurber’s needlegrass (Ganskopp 1988).
Bluebunch wheatgrass is moderately grazing-tolerant and is very sensitive to defoliation during the active growth period (Blaisdell and Pechanec 1949, Laycock 1967, Anderson and Scherzinger 1975). Herbage and flower stalk production was reduced with clipping at all times during the growing season; however, clipping was most harmful during the boot stage (Blaisdell and Pechanec 1949, Britton et al. 1990). Tiller production and growth of bluebunch was greatly reduced when drought was coupled with clipping (Busso and

Richards 1995). Mueggler (1975) estimated that low-vigor bluebunch wheatgrass may need up to 8 years rest to recover. Although an important forage species, it is not always the preferred species by livestock and wildlife.
Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species such as saltlover (Halogeton glomeratus), bur buttercup (Ceratocephala testiculata) and annual mustards to occupy interspaces. Sandberg bluegrass increases under grazing pressure (Tisdale and Hironaka 1981) and is capable of co-existing with cheatgrass. Excessive sheep grazing favors Sandberg bluegrass; however, where cattle are the dominant grazers, cheatgrass often dominates (Daubenmire 1970). Thus, depending on the season of use, the grazer and site conditions, either Sandberg bluegrass or cheatgrass may become the dominant understory with inappropriate grazing management.

Long-term disturbance response may be influenced by small differences in landscape topography. Concave areas hold more moisture and may retain deep-rooted perennial grasses whereas convex areas are slightly less resilient and may have more Sandberg bluegrass present.

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.

Inventory data references

NRCS-RANGE-417 - 2 records

Type locality

Location 1: Elko County, NV	
Township/Range/Section	T45N R47E S21
General legal description	Approximately 10 miles west of Chimney Creek Reservoir and 2½ miles northeast of Bartome Knoll, Owyhee Desert, Elko County, Nevada.

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Contributors

RK/GKB

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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	04/07/2014
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none.

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2. **Presence of water flow patterns:** Water flow patterns are rare but can be expected in areas subjected to summer convection storms or rapid snowmelt.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare. Occurrence is usually limited to areas of water flow patterns.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 30% depending on amount of surface rock fragments

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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

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 3 to 6 on most soil textures found on this site.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick platy or massive. Soil surface colors are light and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 percent dropping off quickly below.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., bluebunch wheatgrass]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are none. Platy or massive sub-surface horizons or subsoil argillic horizons are not to be interpreted as compacted layers.

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: Deep-rooted, cool season, perennial bunchgrasses

    Sub-dominant: shallow-rooted, cool season, perennial grasses>deep-rooted, cool season, perennial forbs>fibrous, shallow-rooted, cool season, annual and perennial forbs>associated shrubs

    Other: grass-like plants

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 35% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (25-35%) and litter depth is ± ¼ inch.

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) ± 600 lbs/ac; Favorable years: 800 lbs/ac; Unfavorable years: 400 lbs/ac

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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 cheatgrass, Russian thistle, and annual mustards.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Reduced growth and reproduction occur during drought years.
