Ecological site R028BY056NV
SILT FLAT

Last updated: 2/19/2025
Accessed: 05/13/2025

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): 028B–Central Nevada Basin and Range

MLRA 28B occurs entirely in Nevada and comprises about 23,555 square miles (61,035 square kilometers). More than nine-tenths of this MLRA is federally owned. This area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by long, gently sloping to strongly sloping alluvial fans. The mountains are uplifted fault blocks with steep sideslopes. Many of the valleys are closed basins containing sinks or playas. Elevation ranges from 4,900 to 6,550 feet (1,495 to 1,995 meters) in the valleys and basins and from 6,550 to 11,900 feet (1,995 to 3,630 meters) in the mountains.
The mountains in the southern half are dominated by andesite and basalt rocks that were formed in the Miocene and Oligocene. Paleozoic and older carbonate rocks are prominent in the mountains to the north. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments are throughout this area. The valleys consist mostly of alluvial fill, but lake deposits are at the lowest elevations in the closed basins. The alluvial valley fill consists of cobbles, gravel, and coarse sand near the mountains in the apex of the alluvial fans. Sands, silts, and clays are on the distal ends of the fans.
The average annual precipitation ranges from 4 to 12 inches (100 to 305 millimeters) in most areas on the valley floors. Average annual precipitation in the mountains ranges from 8 to 36 inches (205 to 915 millimeters) depending on elevation. The driest period is from midsummer to midautumn. The average annual temperature is 34 to 52 degrees F (1 to 11 degrees C). The freeze-free period averages 125 days and ranges from 80 to 170 days, decreasing in length with elevation.
The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or carbonatic mineralogy. They generally are well drained, loamy or loamyskeletal, and shallow to very deep.
Nevada’s climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms and heavy snowfall in the higher mountains. Three basic geographical factors largely influence Nevada’s climate: continentality, latitude, and elevation. 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. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, as a result the lowlands of Nevada are largely desert or steppes.
The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating. Nevada lies within the midlatitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs.
To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with

occasional thundershowers. The eastern portion of the state receives noteworthy summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

Ecological site concept

This site occurs on fan remnants, barrier beaches and beach plains. Slope gradients of 0 to 2 percent are most typical. Elevations are 5800 to 6800 feet.

Average annual precipitation is 8 to 10 inches. Mean annual air temperature is 45 to 50 degrees F. The average growing season is about 100 to 120 days.

The soils associated with this site are very deep and are well drained. Surface soils are medium to moderately fine textured and generally less than 20 inches thick to the subsoil or underlying material. These soils are generally salt and sodium affected throughout the soil profile. The soil surface layer will normally crust and bake upon drying, inhibiting water infiltration and seedling emergence.

The reference state is dominated by Wyoming big sagebrush, bottlebrush squirreltail and Sandberg bluegrass. Production ranges from 150 to 450 pounds per acre.

Associated sites

R028BY014NV	**LOAMY PLAIN 8-10 P.Z.** This site occurs on lake plains of bolson floors. Slopes gradients less than 2 percent.
R028BY054NV	**SILTY PLAIN 8-10 P.Z.** This site occurs on lake plains. Slopes range from 0 to 2 percent. Elevations are 6000 to 6600 feet.
R028BY065NV	**SALINE TERRACE 8-10 P.Z.** This site occurs on alluvial flats, inset fans and fan skirts. Slope gradients of 2 to 4 percent are most typical. Elevations are 5500 to 6200 feet.

Similar sites

R028BY054NV	**SILTY PLAIN 8-10 P.Z.** Wyoming sagebrush-winter fat codominant shrubs; Indian ricegrass-bottlebrush squirreltail codominant grasses; more productive site
R028BY080NV	**SHALLOW LOAM 8-10 P.Z.** Indian ricegrass-Needleandthread codominant grasses; more productive site
R028BY010NV	**LOAMY 8-10 P.Z.** Indian ricegrass-Needleandthread codominant grasses; more productive site
R028BY014NV	**LOAMY PLAIN 8-10 P.Z.** Indian ricegrass-western wheatgrass codominant grasses; more productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. wyomingensis*
Herbaceous	(1) *Elymus elymoides* (2) *Poa secunda*

Physiographic features

This site occurs on fan remnants, barrier beaches and beach plains. Slope gradients of 0 to 2 percent are most typical. Elevations are 5800 to 6800 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Barrier beach (3) Beach plain
Runoff class	Low to medium
Elevation	1,768–2,073 m
Slope	0–2%
Water table depth	183 cm
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.

Average annual precipitation ranges from 8 to 10 inches. Mean annual air temperature is about 45 to 50 degrees F. The average growing season is about 100 to 120 days.

Mean annual precipitaion at the ELY WBO,NEVADA climate station (262631) is 9.72 inches. Monthly mean precipitation is:
January 0.77; February 0.78; March 1.01; April 1.03;
May 1.10; June 0.65; July 0.64; August 0.81;
September 0.75; October 0.82;
November 0.68; December 0.68.

Table 3. Representative climatic features

Frost-free period (average)	66 days
Freeze-free period (average)	110 days
Precipitation total (average)	254 mm

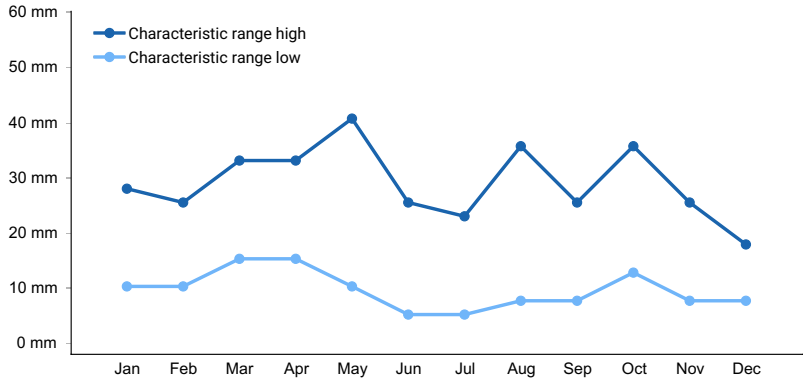

Figure 1. Monthly precipitation range

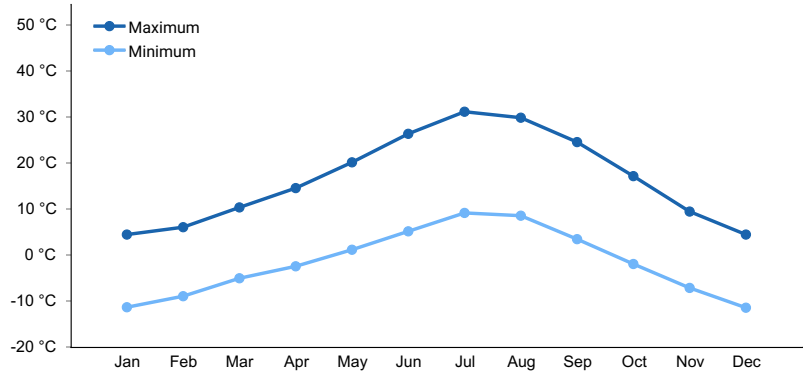

Figure 2. Monthly average minimum and maximum temperature

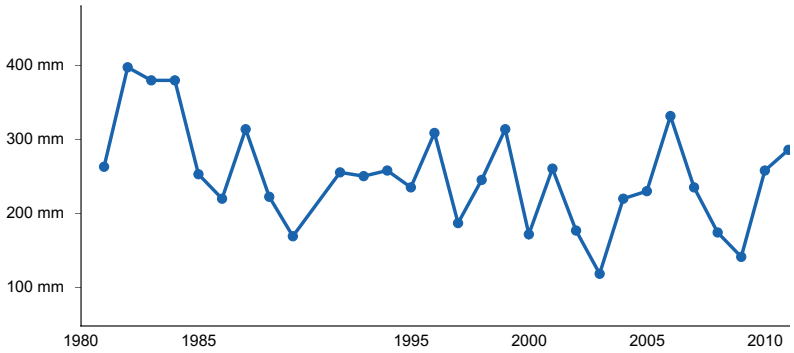

Figure 3. Annual precipitation pattern

Climate stations used

- (1) ELY YELLAND FLD AP [USW00023154], Ely, NV

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are very deep and are well drained. Surface soils are medium to moderately fine textured and generally less than 20 inches thick to the subsoil or underlying material. Surface textures are silt loams, loams or fine sandy loams. These soils are generally salt and sodium affected throughout the soil profile. The soil surface layer will normally crust and bake upon drying, inhibiting water infiltration and seedling emergence. The available water holding capacity is low to moderate. Runoff is low to medium and ponding occurs in many areas. The soil series associated with this site include: Kunzler.

The representative soil series is Kunzler, classified as a coarse-loamy, mixed, superactive, mesic Durinodic Xeric Haplocalcids. An ochric epipedon occurs from the soil surface to 7 inches and a calcic horizon occurs from 16 to 40 inches. Clay content in the particle control section averages 10 to 18 percent. Rock fragments range from 0 to 15 percent, mainly gravel. Reaction is moderately to very strongly alkaline. Effervescence is Slightly effervescent through violently effervescent. Lithology consists of mixed rocks.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Fine sandy loam (3) Sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	152–213 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.45–14.73 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	8.1–9.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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

The 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 m. (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).

Perennial bunchgrasses generally have somewhat 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. General differences in root depth distributions between grasses and shrubs result in resource partitioning in these shrub/grass systems.

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 the deeper rooted shrubs lag in phenological development because they draw from deeply infiltrating moisture from snowmelt the previous winter. 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).

Wyoming big sagebrush, the most drought tolerant of the big sagebrushes, is generally long-lived; therefore it is not necessary for new individuals to recruit every year for perpetuation of the stand. Infrequent large recruitment events and simultaneous low, continuous recruitment is the foundation of population maintenance (Noy-Meir 1973). Survival of the seedlings is depended on adequate moisture conditions.

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 the 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 or can increase resource pools by 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, like 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 the perennial bunchgrasses and forbs may be reduced.

Millions of acres in the arid and semi-arid West have been brush-beaten and planted with crested wheatgrass (*Agropyron cristatum*) in order to benefit both livestock and wildlife and to increase range production (Zlatnik 1999). Crested wheatgrass is a cool-season, medium height, exotic perennial bunchgrass. As a native of Russia, it is adapted to very cold and very dry climates which made it the common choice for range rehabilitation. This site may

exhibit an understory of crested wheatgrass in areas where historical seedings have been allowed to return to sagebrush.
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 a sagebrush defoliator, Aroga moth (Aroga websteri). Aroga moth infestations occurred in the Great Basin in the 1960s, early 1970s, and has 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 observed. Aroga moth can partially or entirely kill individual plants or entire stands of big sagebrush (Furniss and Barr 1975).
This ecological site has low resilience to disturbance and low resistance to invasion. Historically this site would rarely experience fire due to low fuel loads, however the introduction of fine fuels from non-native annual grasses increases fire risk. Three possible alternative stable states have been identified for this site.

Fire Ecology:
Wyoming big sagebrush is easily killed by fire (Blaisdell 1953). Pre-European settlement fire return intervals for Wyoming big sagebrush vary depending on study source and location from 50 to 100 years (Wright and Bailey 1982), 100 to 240 years (Baker 2006), and most recently, Baker (2011) summarized five sources of fire interval estimates and found 200 to 350 years to be the most common estimate. Wyoming big sagebrush only regenerates from seed. Repeated fires may eliminate the onsite seed source; reinvasion into these areas may be extremely slow (Bunting et al. 1987). Reestablishment after fire may require 50 to 120 or more years (Baker 2006). Even then, up to 25 years after fire, Wyoming big sagebrush may have less than 5% of pre-fire cover (Baker 2011). The introduction and expansion of cheatgrass has dramatically altered the fire regime (Balch et al. 2013), therefore altering restoration potential of Wyoming big sagebrush communities (Evans and Young 1978).
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 all factor into the individual species response. 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). However, season and severity of the fire will influence plant response. Plant response will vary depending on post-fire soil moisture availability.
Bottlebrush squirreltail is considered more fire tolerant than Indian ricegrass due to its small size, coarse stems, and sparse leafy material (Britton et al. 1990). Post-fire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Bottlebrush squirreltail has the ability to produce large numbers of highly germinable seeds, with relatively rapid germination (Young and Evans 1977) when exposed to the correct environmental cues. Early spring growth and ability to grow at low temperatures contribute to the persistence of bottlebrush squirreltail among cheatgrass dominated ranges (Hironaka and Tisdale 1973).
A dominant grass on this site, Indian ricegrass, is fairly fire tolerant (Wright 1985), which is likely due to its low culm density and below ground plant crowns. Vallentine (1989) cites several studies in the sagebrush zone that classified Indian ricegrass as being slightly damaged from late summer burning. Indian ricegrass has also been found to reestablish on burned sites through seed dispersed from adjacent unburned areas (Young 1983, West 1994). Thus the presence of surviving, seed producing plants facilitates the reestablishment of Indian ricegrass. Grazing management following fire to promote seed production and establishment of seedlings is important.
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. Reduced deep-rooted bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species such as halogeton to occupy interspaces.

Community Phase 1.1 is dominated by sickle saltbush, Indian ricegrass and western wheatgrass. Production ranges from 350 to 700 pounds per acre.

State and transition model

MLRA 28B
Silt Flat
028BY056NV

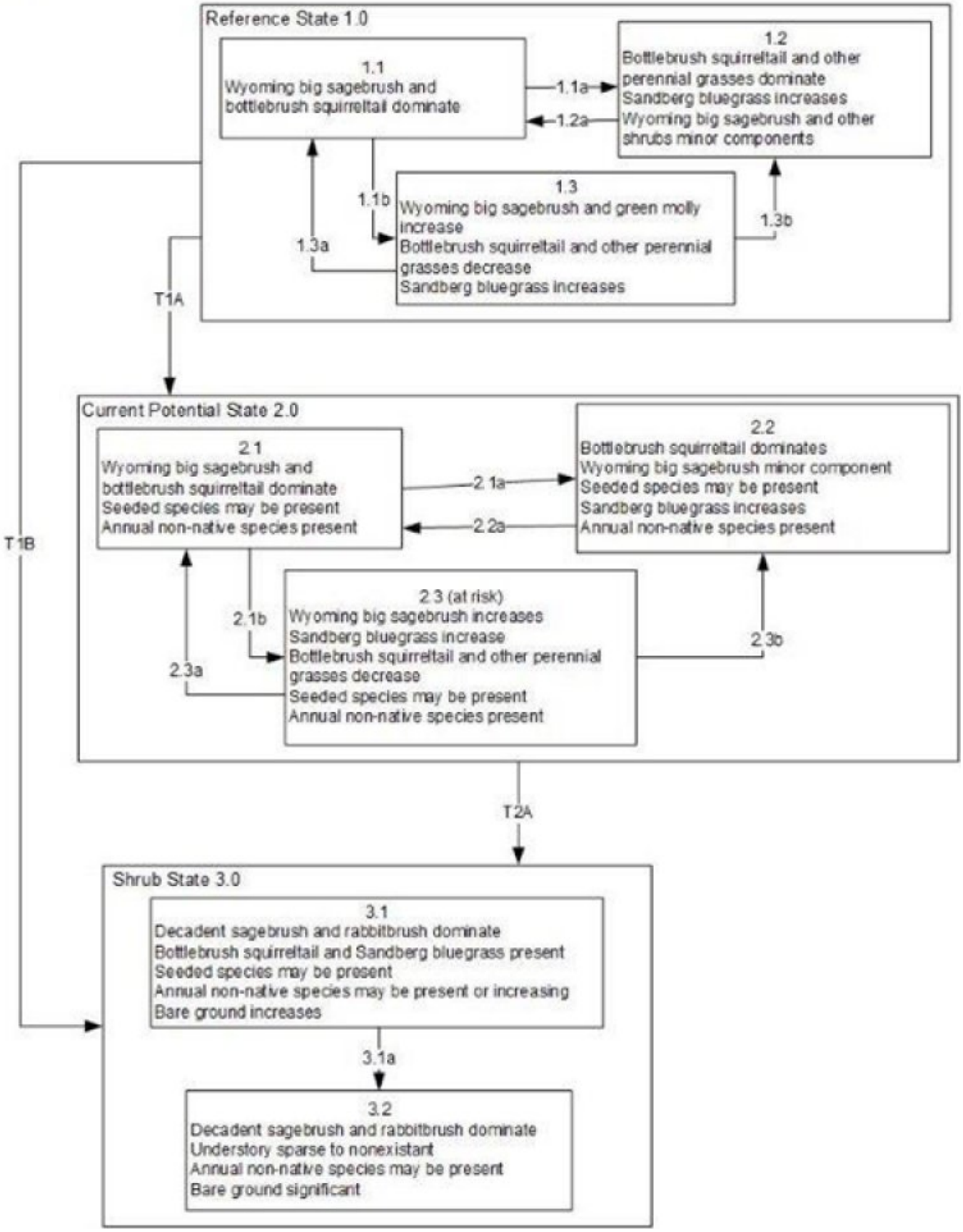

Figure 5. State and Transition Model

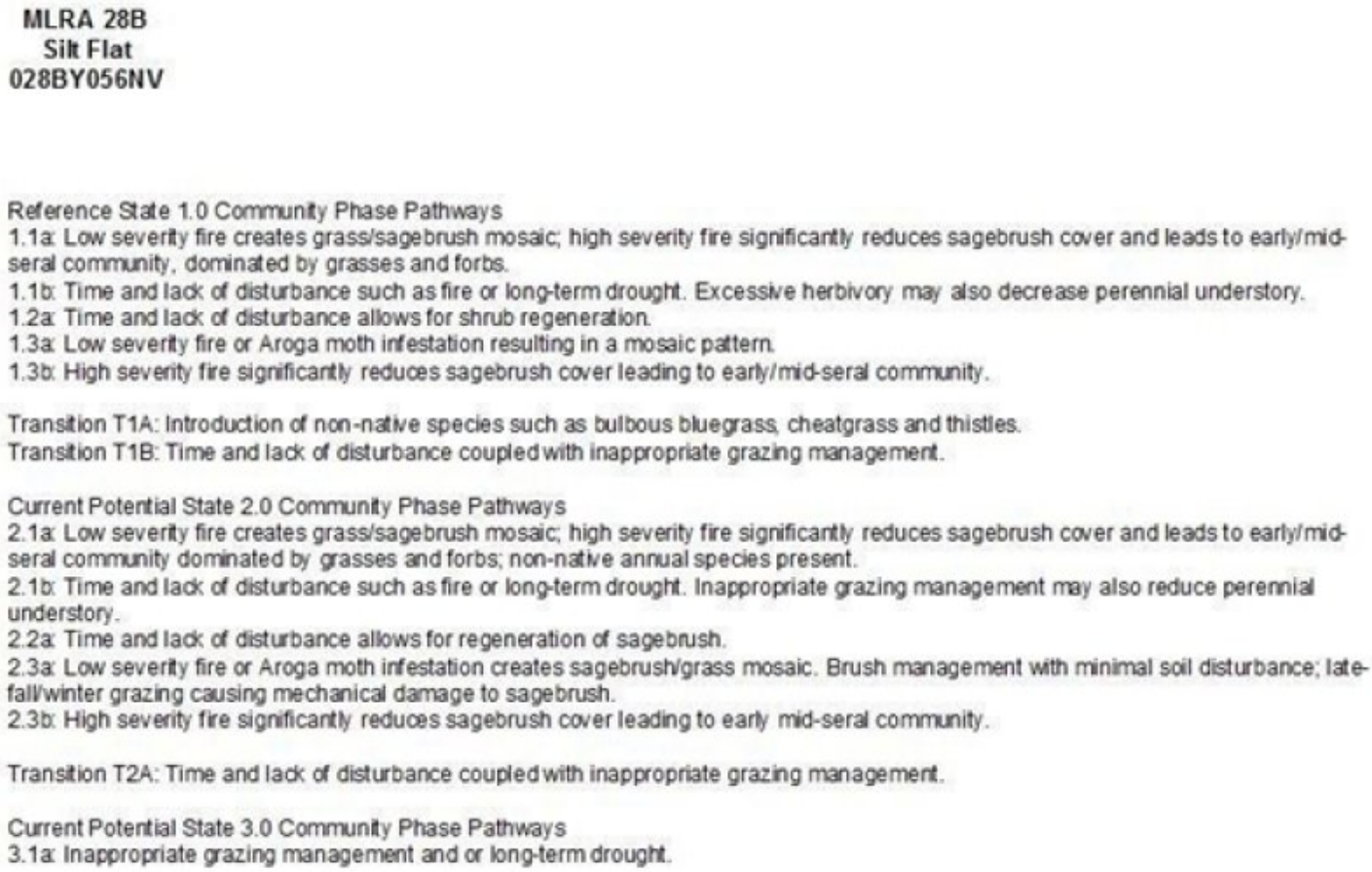

Figure 6. Legend

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management considerations include timing, intensity, frequency, and duration of grazing. 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. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock. Bottlebrush squirreltail generally increases in abundance when moderately grazed or protected (Hutchings and Stewart 1953). In addition, moderate trampling by livestock in big sagebrush rangelands of central Nevada enhanced bottlebrush squirreltail seedling emergence compared to untrampled conditions. Heavy trampling however was found to significantly reduce germination sites (Eckert et al. 1987). Squirreltail is more tolerant of grazing than Bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. Shadscale, sickle saltbush and green molly also provide some forage for livestock. Douglas' rabbitbrush is tolerant of grazing and may be rejuvenated by foliage removal. Douglas' rabbitbrush commonly increases on degraded rangelands as more palatable species are removed.
Overgrazing leads to an increase in sagebrush and a decline in understory plants such as basin wildrye. Squirreltail and Sandberg bluegrass will increase temporarily with further degradation (Jameson 1962, Tisdale and Hironaka 1981). Invasion of annual weedy forbs and cheatgrass could occur with further grazing degradation, leading to a decline in squirreltail and an increase in bare ground. 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

Wildlife Interpretations:

This site provides habitat for wildlife. Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. Douglas' rabbitbrush provides an important source of browse for wildlife, particularly in the late fall and early winter after more palatable species have been depleted. Wild ungulates show varying preference for Douglas' rabbitbrush depending on season, locality, and subspecies. Mature or partially mature plants are generally preferred to green, immature ones. Douglas' rabbitbrush provides important cover for pronghorn fawns. In parts of the Great Basin, plants regrew rapidly after they were nearly completely consumed by spring-browsing black-tailed jackrabbits. Bottlebrush squirreltail is a dietary component of several wildlife species. Bluegrass is desirable for pronghorn antelope and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range.

Hydrological functions

Runoff is low to medium. Permeability is moderately slow. Rills are none. Water flow patterns are rare to common dependent on site location relative to major inflow areas. Moderately fine to fine surface textures and physical crusts result in limited infiltration rates. The surface layer will normally crust and bake upon drying, inhibiting water infiltration and seedling emergence. The available water holding capacity is moderate to moderate. Pedestals are none. There are typically no gullies associated with this site. Shrubs and deep-rooted perennial herbaceous bunchgrasses (i.e., basin wildrye) and/or rhizomatous grasses (western wheatgrass) aid in infiltration.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition. This site offers rewarding opportunities to photographers and for nature study. This site has potential for upland and big game hunting.

Other products

Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal.

Other information

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

Inventory data references

NASIS soil component data.

Type locality

Location 1: White Pine County, NV	
Township/Range/Section	T14N R64E S16
Latitude	39° 4′ 40″
Longitude	114° 47′ 25″
General legal description	SE ¼ SW ¼, About 13 miles south of Ely, approximately 2.4 miles west-southwest of Highway 93/50, White Pine County, Nevada. This site also occurs in Elko County, Nevada.

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Approval

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	P. Novak-Echenique
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Date	09/24/2009
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** This site is nearly flat so rills are not expected.

2. **Presence of water flow patterns:** Water flow patterns are rare to common dependent on site location relative to major inflow areas. Moderately fine to fine surface textures and physical crusts result in limited infiltration rates. The surface layer will normally crust and bake upon drying, inhibiting water infiltration and seedling emergence. The available water holding capacity is moderate to moderate.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare with occurrence limited to flow paths.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 80%.

5. **Number of gullies and erosion associated with gullies:** There are typically no gullies associated with this site.

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) expected to move distance of slope length during periods of intense summer convection storms or run in of early spring snow melt flows. Persistent litter (large woody material) will remain in place except during unusual flooding (ponding) 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 3 to 6. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Structure of soil surface is weak thin platy. Soil surface colors are pale browns and soils are typified by an ochric epipedon. Surface textures are silt loams, loams and fine sandy loams. A vesicular crust is common. Organic carbon is typically less than 3 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shrubs and deep-rooted perennial herbaceous bunchgrasses (i.e., basin wildrye) and/or rhizomatous grasses (western wheatgrass) aid in infiltration. Shrubs and associated litter provide protection from raindrop impact and offer opportunity for snow capture on this 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 subangular blocky subsurface layers are normal for this site and are not to be interpreted as compaction.

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: Reference State: Tall evergreen shrubs (Wyoming big sagebrush)

    Sub-dominant: shallow-rooted cool season, perennial bunchgrasses (bottlebrush squirreltail & Sandberg bluegrass) > salt-desert low stature shrubs (kochia, shadscale, etc.) > deep-rooted, cool season, perennial bunchgrasses = cool season, rhizomatous grasses = deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial and annual forbs

    Other: microbiotic crusts

    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 and standing dead shrub canopy material may be as much as 35% of total woody canopy.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (15-20%%) and depth (± ¼ in.)

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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 (thru June) ± 325 lbs/ac. Favorable years ±450 lbs/ac and unfavorable years ± 150 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 annual mustards, annual kochia, Russian thistle, halogeton, and knapweeds.

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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 occurs during extreme or extended drought periods.
