USDA Natural Resources Conservation Service

# Ecological site R025XY017NV
# CLAYPAN 12-16 P.Z.

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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): 025X–Owyhee High Plateau

The Owyhee High Plateau, MLRA 25, lies within the Intermontane Plateaus physiographic province. The southern half is found in the Great Basin while the northern half is located in the Columbia Plateaus. The southern section of the Owyhee High Plateau 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 section forms the southern boundary of the extensive Columbia Plateau basalt flows. Deep, narrow canyons drain to the Snake River across the broad volcanic plain.

This MLRA is characteristically cooler and wetter than the neighboring MLRAs of the Great Basin. Elevation ranges from 3,000 to 7,550 feet on rolling plateaus and in gently sloping basins. It is more than 9,840 feet on some steep mountains. The average annual precipitation in most of this area is typically 11 to 22 inches. It increases to as much as 49 inches at the higher elevations. Precipitation occurs mainly as snow in winter. The supply of water from precipitation and streamflow is small and unreliable, except along major rivers. Streamflow depends largely on accumulated snow in the mountains.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic or frigid temperature regime and an aridic, arid bordering on xeric, or xeric moisture regime. Most of the soils formed in mixed parent material. Volcanic ash and loess mantle the landscape. Surface soil textures are loam and silt loam, and have ashy texture modifiers in some cases. Argillic horizons occur on the more stable landforms.

## Ecological site concept

This ecological site is on summits and side slopes of mountains. Soils associated with this site formed in residuum and colluvium derived from volcanic rocks. Soils are shallow and well drained with a high runoff potential. Slopes are generally less than 30 percent with elevations of 6,000 to 8,000 feet (1,829 to 2,438 meters). The soil profile is characterized by a dark surface horizon (mollic epipedon) and a horizon clay accumulation (argillic) within 8 inches (20cm). Important abiotic factors contributing to the presence of this ecological site include an abrupt boundary to an argillic horizon contributing to wet non-satiated conditions, linear-linear landform shape, and high runoff reducing the overall soil moisture storage. The reference plant community is dominated by low sagebrush and Idaho fescue.

## Associated sites

| | |
|---|---|
| R025XY009NV | **SOUTH SLOPE 12-14 P.Z.** |
| R025XY012NV | **LOAMY SLOPE 12-16 P.Z.** |
| R025XY024NV | **MOUNTAIN RIDGE** |
| R025XY027NV | **LOAMY 12-14 P.Z.** |
| R025XY047NV | **CLAY SEEP** |

## Similar sites

| | |
|---|---|
| R025XY022NV | **COBBLY CLAYPAN 8-12 P.Z.**<br>PSSPS-ACTH7 codominant grasses; less productive site; greater than 60% rock fragments on soil surface |
| R025XY024NV | **MOUNTAIN RIDGE**<br>Much less productive site; soils are very shallow; convex-convex landform shape |
| R025XY018NV | **CLAYPAN 10-12 P.Z.**<br>PSSPS-ACTH7 codominant grasses; occurs on fan remnants below 6,500' |
| R025XY010ID | **CLAYPAN 12-16**<br>Gravely loam surface with accumulation of clay within 11cm of surface. |
| R025XY416UT | **Mountain Shallow Loam (Low Sagebrush)**<br>landscape and soil characteristics are similar to 025XY017NV |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Artemisia arbuscula* |
| Herbaceous | (1) *Pseudoroegneria spicata* |

## Physiographic features

This ecological site is on summits and side slopes of mountains and hills. Slopes range from 4 to 50 percent, but are typically between 4 to 30 percent. Elevations range from 6,000-8,000 feet (1,829 to 2,438 meters). This site has high to very high runoff potential.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Mountains > Mountain slope<br>(2) Hills > Hillslope |
| Runoff class | High to very high |
| Flooding frequency | None |
| Elevation | 6,000–8,000 ft |
| Slope | 4–50% |
| Water table depth | 150 in |
| Aspect | Aspect is not a significant factor |

## Climatic features

The climate associated with this site is defined by hot dry summers and cold snowy winters. This is site is characterized by less than 145 freeze-free days annually. Mean annual precipitation is typically 13 inches (33cm) with an effective precipitation between 12 to 16 inches (31 to 41cm). Averages snowfall is between 40 to 65 inches (101 to 165cm) per year.

* The above data is average from the Tuscarora and Wild Horse climate stations, NASIS and, the Western Regional Climate Center (wrcc.dri.edu).

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (characteristic range) | 56-100 days |
| Freeze-free period (characteristic range) | 97-146 days |
| Precipitation total (characteristic range) | 11-14 in |

| | |
|---|---|
| Frost-free period (actual range) | 50-100 days |
| Freeze-free period (actual range) | 63-166 days |
| Precipitation total (actual range) | 7-22 in |
| Frost-free period (average) | 70 days |
| Freeze-free period (average) | 145 days |
| Precipitation total (average) | 13 in |

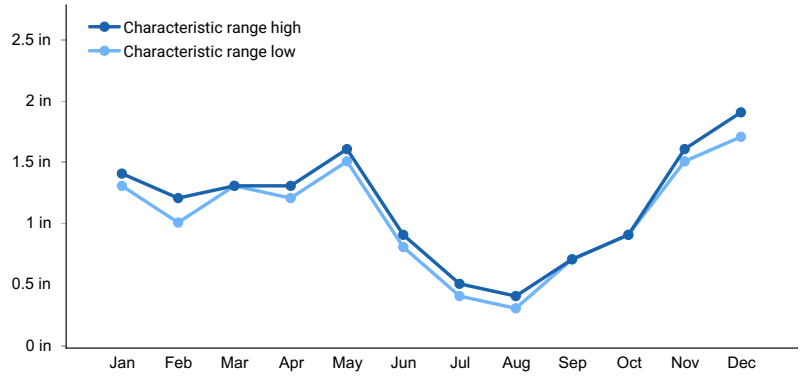



**Figure 1. Monthly precipitation range**

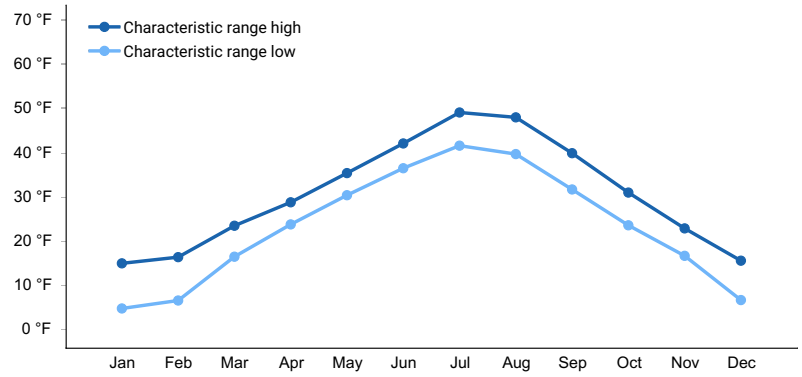



**Figure 2. Monthly minimum temperature range**

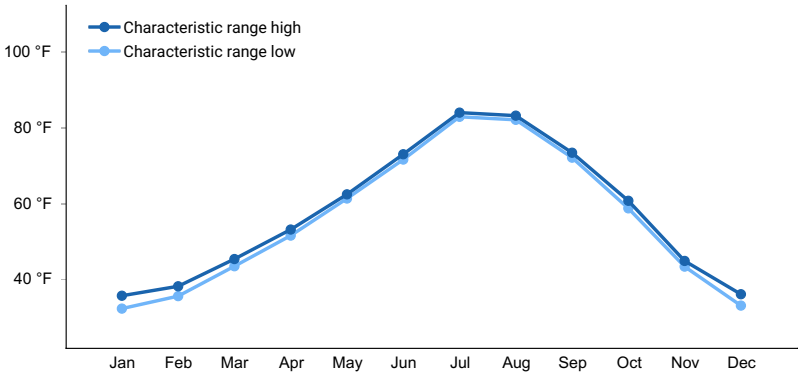



**Figure 3. Monthly maximum temperature range**

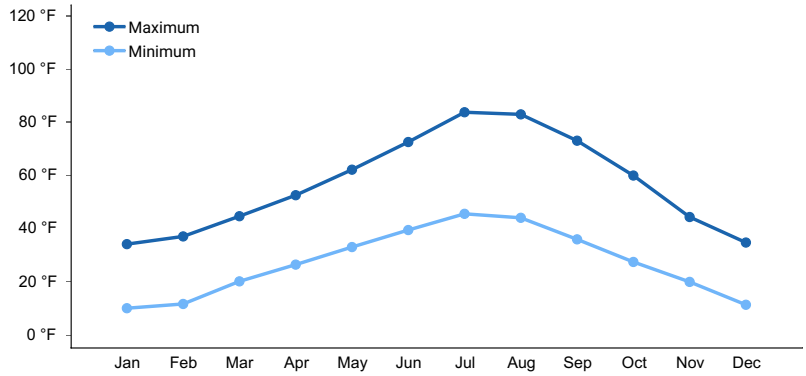



**Figure 4. Monthly average minimum and maximum temperature**

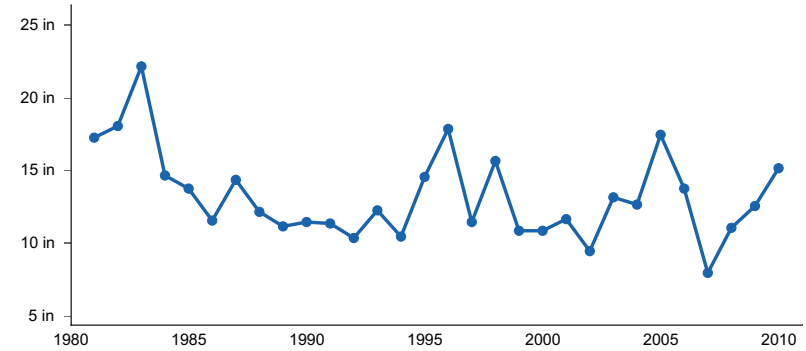



**Figure 5. Annual precipitation pattern**

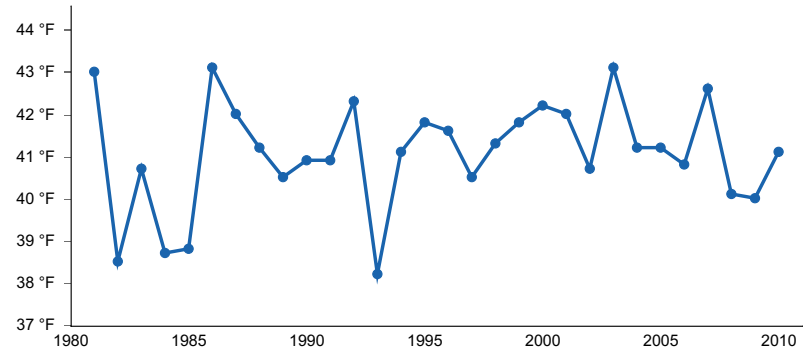



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) TUSCARORA [USC00268346], Tuscarora, NV
- (2) WILD HORSE RSVR [USC00269072], Deeth, NV

## Influencing water features

This ecological site is not influenced by adjacent wetlands, streams or run-on. No water table is present.

## Wetland description

N/A

## Soil features

The soils associated with this site are shallow, well drained, and formed in residuum and colluvium derived from volcanic rocks. Surface texture is typically cobbly loam or gravely loam. Soils are less than 20 inches (50cm) to bedrock with an abrupt boundary to an layer of clay accumulation (argillic horizon) 2 to 4 inches (5 to 10cm) from the soil surface. The soil profile is characterized by a dark surface horizon (mollic epipedon) and greater than 35

percent clay in the particle size control section and less than 35 percent rock fragments by volume distributed through out the upper soil profile.

Representative soil components associated with this ecological site include Ninemile, Chen, Cotant, Coser, and Igdell.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Colluvium–volcanic rock<br>(2) Residuum–volcanic rock |
| Surface texture | (1) Cobbly, gravelly loam |
| Drainage class | Well drained |
| Permeability class | Slow to moderately slow |
| Depth to restrictive layer | 12–20 in |
| Soil depth | 12–20 in |
| Surface fragment cover <=3" | 12–33% |
| Surface fragment cover >3" | 2–14% |
| Available water capacity (Depth not specified) | 2–3.2 in |
| Soil reaction (1:1 water) (Depth not specified) | 6.1–7.8 |
| Subsurface fragment volume <=3" (Depth not specified) | 14–33% |
| Subsurface fragment volume >3" (Depth not specified) | 3–13% |

**Table 5. Representative soil features (actual values)**

| | |
|---|---|
| Drainage class | Not specified |
| Permeability class | Not specified |
| Depth to restrictive layer | 10–40 in |
| Soil depth | 10–40 in |
| Surface fragment cover <=3" | Not specified |
| Surface fragment cover >3" | Not specified |
| Available water capacity (Depth not specified) | Not specified |
| Soil reaction (1:1 water) (Depth not specified) | Not specified |
| Subsurface fragment volume <=3" (Depth not specified) | Not specified |
| Subsurface fragment volume >3" (Depth not specified) | Not specified |

## Ecological dynamics

This ecological site is dominated by deep-rooted cool season, perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. Community types with little sagebrush as the dominant shrub were found to have soil depths (and thus available rooting depths) of 71 to 81 centimeters in a study in northeast Nevada (Jensen 1990). These shrubs have a flexible generalized root system with development of both deep taproots and laterals near the surface (Comstock and Ehleringer 1992).

Periodic drought regularly influences sagebrush ecosystems and drought duration and severity have 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 with the soil profile (Bates et al. 2006).

Little sagebrush is fairly drought tolerant but also tolerates periodic wetness during some portion of the growing season. Little sagebrush is also susceptible to the sagebrush defoliator Aroga moth. Aroga moth can partially or entirely kill individual plants or entire stands of big sagebrush (Furniss and Barr 1975), but the research is inconclusive of the damage sustained by little sagebrush populations.

The perennial bunchgrasses that are dominant on this site include Idaho fescue and bluebunch wheatgrass. These species generally have shallower root systems than the shrubs, 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. Differences in root depth distributions between grasses and shrubs result in resource partitioning in these shrub/grass systems.

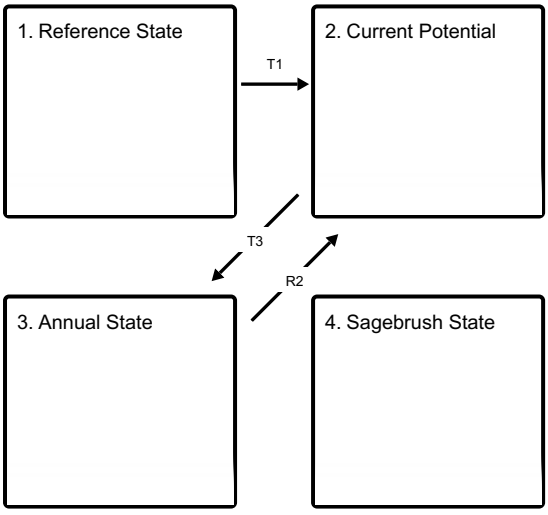
The Great Basin sagebrush communities have high spatial and temporal variability in precipitation both among years and within growing seasons. Prior to 1897, mean fire return intervals for little sagebrush communities have been estimated to be from 35 to over 100 years. Fire risk is greatest following a wet, productive year when there is greater production of fine fuels (Beardall and Sylvester 1976). Nutrient availability is typically low but increases with elevation and closely follows moisture availability. 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, 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.

As ecological condition declines, little sagebrush species and Douglas rabbitbrush become dominant with increases of bottlebrush squirreltail, Sandberg's bluegrass, and mat forming forbs in the understory. The potential invasive/noxious weeds are cheatgrass, rabbitbrush, snakeweed, and annual mustards.

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

## State and transition model

**Ecosystem states**

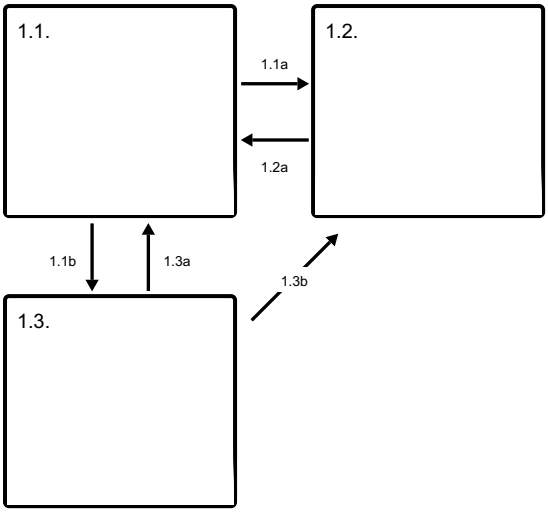



**T1** - Introduction of annual non-native species.

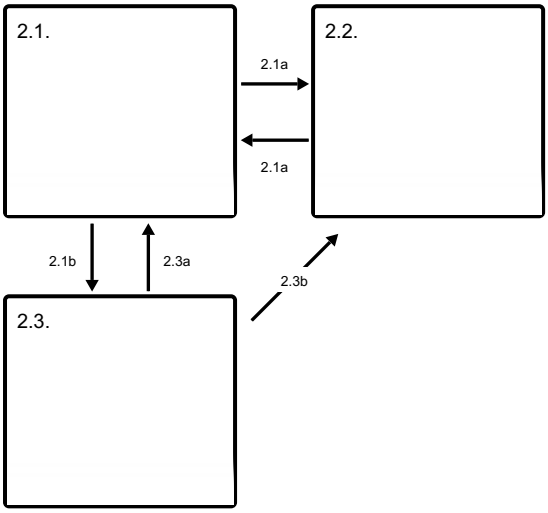
**T3** - Repeated, widespread and severe fire.

**R2** - Seeding with native species/prescribed grazing

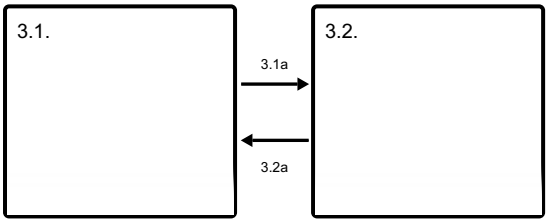
**State 1 submodel, plant communities**



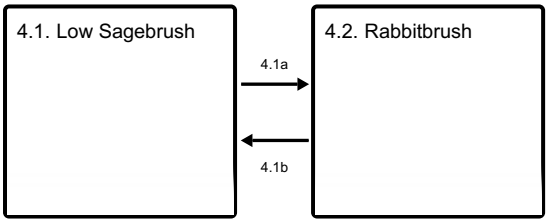

**State 2 submodel, plant communities**




**State 3 submodel, plant communities**




**State 4 submodel, plant communities**




## State 1
## Reference State

The Reference State is a representative of the natural range of variability under pristine 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.

**Characteristics and indicators.** Little sagebrush is killed by fire and does not sprout (Tisdale and Hironaka 1984).

Establishment after fire is from seed, generally blown in and not from the seed bank (Bradley et al. 1992). Fire return intervals have been estimated at 100-200 years in black sagebrush-dominated sites (Kitchen and McArthur 2007) and likely is similar in the low sagebrush ecosystem. Historically, however, fires were probably patchy due to the low productivity of these sites.

**Dominant plant species**

- little sagebrush (*Artemisia arbuscula*), shrub
- Idaho fescue (*Festuca idahoensis*), grass
- Sandberg bluegrass (*Poa secunda*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass

## Community 1.1

This community phase is characteristic of a mid-seral plant community and is dominated by little sagebrush, bluebunch wheatgrass and Idaho fescue. Potential vegetative composition by weight is about 60 percent grasses, 15 percent forbs and 25 percent shrubs. Total vegetative cover averages 20 to 35 percent.

**Table 6. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 240 | 420 | 540 |
| Shrub/Vine | 100 | 175 | 225 |
| Forb | 60 | 105 | 135 |
| **Total** | **400** | **700** | **900** |

## Community 1.2

This community phase is characterized by a post-disturbance, early seral, plant community. Sagebrush and other shrubs are reduced, or patchy. Perennial bunchgrasses and forbs dominate the visual aspect of the plant community. Disturbance tolerant shrubs such as antelope bitterbrush will sprout from the root-crown following low and medium intensity wildfire and may begin to dominate the plant community 2 to 5 years post-disturbance.

**Resilience management.** Recovery time of little sagebrush following fire is variable (Young 1983). After fire, if regeneration conditions are favorable, little sagebrush recovers in 2 to 5 years; on harsh sites where cover is low to begin with and/or erosion occurs after fire, recovery may require more than 10 years (Young 1983). Bitterbrush sprouts from a region on the stem approximately 1.5 inches above and below the soil surface; the plant rarely sprouts if the root crown is killed by fire (Blaisdell and Mueggler 1956). Low intensity fires may allow for bitterbrush to sprout; however, community response also depends on soil moisture levels at time of fire (Murray 1983). Idaho fescue responds to fire variably depending on condition and size of the plant, season and severity of fire, and ecological conditions. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons (Wright et al. 1979). Initial mortality may be high (in excess of 75%) on severe burns, but usually varies from 20 to 50% (Barrington et al 1988).

## Community 1.3

Absence of disturbance allows sagebrush to mature and dominate the plant community. Perennial bunchgrasses and forbs are reduced in both vigor and productivity due to competition for light, moisture and nutrient resources.

## Pathway 1.1a
## Community 1.1 to 1.2

Wildfire. Low severity fire creates sagebrush/grass mosaic; higher intensity fires significantly reduce sagebrush cover and lead to early seral community dominated by grasses and forbs. Frequency and intensity of wildfire is primarily driven by cover and amount of herbaceous vegetation.

### Pathway 1.1b
### Community 1.1 to 1.3

Time, absence of disturbance and natural regeneration over time allows sagebrush to dominate site resources, resulting in reduced cover and productivity of native perennial bunchgrasses. This community phase pathway may be coupled with drought and/or herbivory further reducing herbaceous understory.

### Pathway 1.2a
### Community 1.2 to 1.1

Time, absence of disturbance and natural regeneration over time allows sagebrush to recover. Recovery of sagebrush depends on the availability of a local seed source (patches of mature shrubs) as well as precipitation patterns favorable for germination and seedling recruitment. Sagebrush seedlings are susceptible to less than favorable conditions for several years. Recovery time of little sagebrush following fire is variable (Young 1983). After fire, if regeneration conditions are favorable, little sagebrush recovers in 2 to 5 years; on harsh sites where cover is low to begin with and/or erosion occurs after fire, recovery may require more than 10 years (Young 1983).

### Pathway 1.3a
### Community 1.3 to 1.1

Low intensity, patchy wildfire or insect infestation would reduce sagebrush overstory creating a mosaic on the landscape. Sagebrush cover is reduced and perennial bunchgrasses and forbs increase, dominating disturbed patches due to an increase in light, moisture and nutrient resources.

### Pathway 1.3b
### Community 1.3 to 1.2

Wide spread wildfire removes sagebrush and allows perennial bunchgrasses and forbs to dominate.

## State 2
## Current Potential

This state is similar to the Reference State 1.0. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. This state has the same three general community phases. These non-natives can be highly flammable, and can promote fire where historically fire had been infrequent. 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. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate and adaptations for seed dispersal. Management would be to maintain high diversity of desired species to promote organic matter inputs and prevent the dispersal and seed production of the non-native invasive species.

**Dominant plant species**

- little sagebrush (*Artemisia arbuscula*), shrub
- cheatgrass (*Bromus tectorum*), grass
- Idaho fescue (*Festuca idahoensis*), grass
- bluebunch wheatgrass (*Pseudoroegneria spicata*), grass

### Community 2.1

This community phase is similar to the Reference State Community Phase 1.1, with the presence of non-native species in trace amounts.

**Resilience management.** The presence of non-native annuals has reduced site resilience. Management actions should focus on maintaining the presence of all functional and structural groups and minimizing wildfire and soil disturbing practices.

### Community 2.2

This community phase is characteristic of a post-disturbance, early seral community where annual non-native species are present. Perennial bunchgrasses and forbs recover rapidly following wildfire. Annual non-native species are stable or increasing within the community. Disturbance tolerant shrubs typically recover 2 to 5 years post fire and may dominate the sites for many years.

**Resilience management.** Antelope bitterbrush is moderately fire tolerant (McConnell and Smith 1977). It regenerates by seed and resprouting (Blaisdell and Mueggler 1956, McArthur et al. 1982), though sprouting ability is highly variable and has been attributed to genetics, plant age, phenology, soil moisture and texture, and fire severity (Blaisdell and Mueggler 1956, Blaisdell et al. 1982, Clark et al. 1982, Cook et al. 1994). If cheatgrass is present, bitterbrush seedling success is much lower. The factor that most limits establishment of bitterbrush seedlings is competition for water resources with cheatgrass, an invasive species (Clements and Young 2002).

### Community 2.3

This community phase is characterized by decadent sagebrush, reduced perennial bunchgrass and increasing bare ground. Annual non-natives species are stable or increasing due to lack of competition from perennial bunchgrasses.

### Pathway 2.1a
### Community 2.1 to 2.2

Fire reduces the shrub overstory and allows for perennial bunchgrasses to dominate the site. Fire may be patchy resulting in a mosaic pattern with patches of mature sagebrush remaining. Annual non-native species are likely to increase after fire.

### Pathway 2.1b
### Community 2.1 to 2.3

Time and lack of disturbance allows for sagebrush to increase and become decadent. Mature sagebrush is controlling the spatial and temporal distribution of moisture, nutrient and light resources. Native perennial bunchgrasses are reduced due to competition for these resources. Non-native annuals are stable to increasing.

### Pathway 2.1a
### Community 2.2 to 2.1

Time, lack of disturbance and natural regeneration of sagebrush. The establishment of little sagebrush depends on presence of seed source and favorable weather patterns. It may take decades for sagebrush to recover to pre-disturbance levels.

### Pathway 2.3a
### Community 2.3 to 2.1

Low intensity wildfire, insect infestation, or brush management with minimal soil disturbance reduces sagebrush overstory and releases herbaceous understory.

### Pathway 2.3b
### Community 2.3 to 2.2

Fire reduces or eliminates the overstory of sagebrush and allows for the understory perennial grasses and forbs to increase. Annual non-native species respond well to fire and may increase post-burn.

## State 3
## Annual State

Annual non-natives dominated site productivity and site resources. The dominance of non-native annuals control

the spatial and temporal distribution of soil moisture, soil nutrients and energy resources. Remaining patches of sagebrush and/or perennial bunchgrass suffer from increased competition and narrowed fire return intervals.

**Characteristics and indicators.** This state experiences frequent fire due to increased cover and continuity of fine fuels. Fire is frequent enough to prevent the recovery of long-lived native perennials like sagebrush. Disturbance tolerant shrubs may be present or increasing depending on time since disturbance.

**Dominant plant species**

- cheatgrass (*Bromus tectorum*), grass

### Community 3.1

This community phase in dominated by annual non-native plants such as cheatgrass. Sprouting shrubs such as antelope bitterbrush may also common. Patches of mature sagebrush may or may not be present.

### Community 3.2

This community phase is characteristic of a post-wildfire community where annual non-natives are controlling site resources. Depending on season and/or intensity of fire the visually aspect of the site in dominated annual non-natives and bare ground. Site may be experiencing soil loss.

**Resilience management.** This community phases is high susceptible to frequent and repeated wildfire. Best management practices prevent sites from reaching this community phase. Management options are extremely limited.

### Pathway 3.1a
### Community 3.1 to 3.2

Fire reduces or eliminates the overstory shrubs and shallow-rooted perennials and allows for annual non-natives to increase

### Pathway 3.2a
### Community 3.2 to 3.1

Time and lack of fire allows for sagebrush/rabbitbrush to establish. Probability of sagebrush establishment is very unlikely and dependent on a near-by seed source from unburned patches of sagebrush.

## State 4
## Sagebrush State

Sagebrush dominates ecological functions.

### Community 4.1
### Low Sagebrush

Low sagebrush and rabbitbrush dominate. Sandberg bluegrass dominates understory with annual species present.

### Community 4.2
### Rabbitbrush

Sprouting rabbitbrush with a sagebrush trace. Sandberg bluegrass dominates with annual species increasing.

### Pathway 4.1a
### Community 4.1 to 4.2

Wildfire reduces the amount of sagebrush.

### Pathway 4.1b
### Community 4.2 to 4.1

Lack of disturbance will give sagebrush time to recover.

### Transition T1
### State 1 to 2

Trigger: Introduction of annual non-native species Slow variable: Over time the annual non-native plants increase within the community. Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

### Transition T3
### State 2 to 3

Trigger: Repeated, widespread and severe fire. Slow variables: Increased production and cover of non-native annual species over time. Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community.

### Restoration pathway R2
### State 3 to 2

Seeding with native species followed by prescribed grazing Minimize soil disturbance and maximize non-native annual plant biomass removal during early spring. Combine prescribed grazing with seeding of native species. Continue to protect site from wildfire. Probability of success is extremely low.

## Additional community tables

**Table 7. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | | | | 240–540 | |
| | Idaho fescue | FEID | *Festuca idahoensis* | 135–290 | – |
| | bluebunch wheatgrass | PSSP6 | *Pseudoroegneria spicata* | 60–160 | – |
| | bluegrass | POA | *Poa* | 15–30 | – |
| | basin wildrye | LECI4 | *Leymus cinereus* | 10–20 | – |
| | Thurber's needlegrass | ACTH7 | *Achnatherum thurberianum* | 10–20 | – |
| | squirreltail | ELEL5 | *Elymus elymoides* | 10–20 | – |
| **Forb** | | | | | |
| 2 | | | | 60–135 | |
| | daggerpod | ANEU | *Anelsonia eurycarpa* | 6–14 | – |
| | phlox | PHLOX | *Phlox* | 6–14 | – |
| | milkvetch | ASTRA | *Astragalus* | 6–14 | – |
| | pussytoes | ANTEN | *Antennaria* | 6–14 | – |
| | desertparsley | LOMAT | *Lomatium* | 6–14 | – |
| | lupine | LUPIN | *Lupinus* | 6–14 | – |
| | buckwheat | ERIOG | *Eriogonum* | 6–14 | – |
| | goldenweed | PYRRO | *Pyrrocoma* | 6–14 | – |
| | balsamroot | BALSA | *Balsamorhiza* | 6–14 | – |
| | tapertip hawksbeard | CRAC2 | *Crepis acuminata* | 6–14 | – |
| **Shrub/Vine** | | | | | |
| 3 | | | | 100–225 | |
| | little sagebrush | ARAR8 | *Artemisia arbuscula* | 80–185 | – |
| | rabbitbrush | CHRYS9 | *Chrysothamnus* | 5–10 | – |
| | Utah serviceberry | AMUT | *Amelanchier utahensis* | 5–10 | – |
| | slender buckwheat | ERMI4 | *Eriogonum microthecum* | 5–10 | – |
| | antelope bitterbrush | PUTR2 | *Purshia tridentata* | 5–10 | – |

## Animal community

Livestock Interpretations:
This site is suited for livestock grazing. Considerations for grazing management include timing, intensity and duration of grazing. Targeted grazing could be used to decrease the density of non-natives.

In general, bunchgrasses best tolerate light grazing after seed formation. Britton and others (1979) observed the effects of harvest date on basal area of 5 bunchgrasses in eastern Oregon, including Idaho fescue, and found grazing from August to October (after seed set) has the least impact on these bunchgrasses. Therefore, abusive grazing during the growing season will reduce perennial bunchgrasses, with the exception of Sandberg bluegrass (Tisdale and Hironaka 1981). Abusive grazing by cattle or horses will also likely increase low sagebrush, rabbitbrush and some forbs such as arrowleaf balsamroot. Annual non-native weedy species may invade, such as cheatgrass and mustards, and potentially medusahead.

Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species to occupy interspaces. Bluegrass is a widespread, palatable forage grass that is one of the earliest grasses in the spring and is sought by domestic livestock and several wildlife species. Its production is closely tied to weather conditions; little forage is produced in drought years, making it a less dependable food source than other perennial bunchgrasses. Sandberg bluegrass increases under grazing pressure (Tisdale and

Hironaka 1981) and is capable of co-existing with cheatgrass or other weedy species. 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.

Idaho fescue provides important forage for many types of domestic livestock. The foliage cures well and is preferred by livestock in late fall and winter. Idaho fescue tolerates light to moderate grazing (Ganskopp and Bedell 1980) and is moderately resistant to trampling (Cole 1987). Heavy grazing may lead to replacement of Idaho fescue with non-native species such as cheatgrass (Mueggler 1984).

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, Britton et al. 1990). 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). Tiller production and growth of bluebunch was also greatly reduced when clipping was coupled with drought (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.

Domestic sheep and, to a much lesser degree, cattle consume low sagebrush, particularly during the spring, fall, and winter (Sheehy and Winward 1981). Heavy dormant season grazing by sheep will reduce sagebrush cover and increase grass production (Laycock 1967). Severe trampling damage to supersaturated soils may occur if sites are used in early spring when there is abundant snowmelt. Trampling damage, particularly from cattle or horses, in low sagebrush habitat types is greatest when high clay content soils are wet. In drier areas that contain more gravelly soils, no serious trampling damage occurs, even when the soils are wet (Hironaka et al. 1983).

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:
Low sagebrush is considered a valuable browse plant for wildlife during the spring, fall and winter months. In some areas, it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer low sagebrush, particularly in winter and early spring.
Idaho fescue is an important source of forage to pronghorn and deer in ranges of northern Nevada.

## Hydrological functions

Infiltration of water is restricted once these soils are wetted and the site is subject to loss of water by runoff. Loss of the surface layer will result in decreased productivity of the site. Pedestalling of some grass plants is common during the winter due to frost heaving. Rills are none to rare. A few rills can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt. Fine litter (foliage from grasses and annual and perennial forbs) is expected to move the distance of slope length during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events. Perennial herbaceous plants (especially deep-rooted bunchgrasses) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

## Recreational uses

Aesthetic value is derived from the many varied and colorful wildflowers blooming on this site in the spring and early summer. This site has potential for upland game hunting, nature study and photography.

## Other information

Low sagebrush can be successfully transplanted or seeded in restoration. Antelope bitterbrush has been used extensively in land reclamation. Antelope bitterbrush enhances succession by retaining soil and depositing organic material and in some habitats and with some ecotypes, by fixing nitrogen.

## Inventory data references

NRCS-Range 417- 11 records
NV-ECS-1- 6 records
NV-4400-13(BLM)- 9 records
Old SS Manuscripts, Range Site Descriptions, etc.

## Type locality

| Location 1: Elko County, NV | |
|---|---|
| Township/Range/Section | T35N R54E S26 |
| General legal description | NW1/4,NW1/4 Section 26, T35N. R54E. MDBM. Approximately 12 miles north of Elko off east side of Mountain City highway, north slope of Adobe summit, Elko County, Nevada. This site also occurs in Humboldt County, Nevada. |

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## Approval

Kendra Moseley, 4/24/2024

## 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) | GK BRACKLEY |
| Contact for lead author | State Rangeland Management Specialist |
| Date | 06/22/2006 |
| Approved by | Kendra Moseley |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** Rills are none to rare. A few rills can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare but can be expected in areas recently subjected to summer convection storms or rapid snowmelt, usually on steeper slopes. Flow patterns will be short (<1m), meandering and not connected.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to 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 ± 40% depending on the amount of surface cover of 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. (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):** Surface structure is typically thin to thick platy. Soil surface colors are dark browns or grayish browns and soils are typified by a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 1.25 to 3 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

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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 [Idaho fescue & 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.

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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):** Compacted layers are none. Subsoil argillic horizons are not to be interpreted as compacted.

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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: Deep-rooted, cool season, perennial bunchgrasses

    Sub-dominant: low shrubs (low sagebrush)>deep-rooted, cool season, perennial forbs>shallow-rooted, cool season, perennial bunchgrasses>associated shrubs>fibrous, shallow-rooted, cool season, perennial and annual forbs

    Other:

    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 25% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.

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14. **Average percent litter cover (%) and depth ( in):** Reference Plant Community: Between plant interspaces (20-35%) and litter depth is < 1/4 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 mid-June) ± 700 lbs/ac; Spring 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 snakeweed, cheatgrass, 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 extreme or extended drought periods.

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