

## Ecological site R029XY006NV LOAMY 8-10 P.Z.

Last updated: 2/20/2025  
Accessed: 02/24/2025

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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): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.

#### Physiography:

The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.

#### Geology:

The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.

#### Climate:

The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.

#### Water Resources:

Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water is naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.

#### Soils:

Dominant soil orders include Entisols and Aridisols.

### Ecological site concept

The Loamy 8-10 P.Z. ecological site is found on fan remnants. Soils associated with this site are well drained, shallow to a duripan, and formed in alluvium derived from volcanic parent material. The soil profile is characterized by an ochric epipedon, a cemented duripan within 50cm and an argillic horizon with no abrupt textural change.

## Associated sites

|             |   |
|-------------|---|
| R029XY008NV | <p><b>SHALLOW CALCAREOUS LOAM 8-12 P.Z.</b><br/>           Black sagebrush dominated. This site occurs on fan remnants, inset fans, and mountains on all exposures. Slopes range from 0 to 75 percent, but slope gradients of 4 to 30 percent are most typical. Elevations are 4200 to 8000 feet. The soils associated with this site are very shallow to very deep or they have a restrictive layer within the main rooting depth. These soils are moderately to strongly calcareous and soil reaction increases with soil depth. Some soils will accumulate variable concentrations of salts and sodium in their lower substratum. The soils are often modified with high amounts of gravels, cobbles or stones on the surface.</p> |
| R029XY009NV | <p><b>UPLAND WASH</b><br/>           This site occurs in drainageways on intermountain valley fans and active channels of hills and mountains and on inset fans of upper piedmont slopes. Slopes range from 2 to 15 percent, but slope gradients of 4 to 8 percent are most typical. Elevations are 3800 to 6200 feet. Flooding may occur occasionally and is very brief. The soils are deep alluvium from mixed sources. They are quite variable as they continue to be re-worked by water.</p>  |
| R029XY010NV | <p><b>LOAMY SLOPE 8-10 P.Z.</b><br/>           This site occurs on piedmont slopes, rock pediments, hills, and lower mountain sideslopes on all exposures. Slopes range from 4 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4400 to about 8200 feet. The soils are very shallow to moderately deep and are derived from a variety of parent materials. The surface may be stony, cobbly or gravelly.</p>  |
| R029XY049NV | <p><b>SANDY LOAM 8-12 P.Z.</b><br/>           This site occurs on inset fans, fan remnants and alluvial fans on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 15 percent are most typical. Elevations are 4300 to about 7800 feet. The soils are very deep, well to somewhat excessively well drained, and typically formed in mixed alluvium. Soil surface textures are moderately coarse and there are high amounts of gravels on the surface.</p>  |

## Similar sites

|             |   |
|-------------|---|
| R029XY029NV | <p><b>LOAMY 10-12 P.Z.</b><br/>           More productive site; ARVA2 present</p>                 |
| R029XY049NV | <p><b>SANDY LOAM 8-12 P.Z.</b><br/>           More productive site; coarse textured soils</p>     |
| R029XY010NV | <p><b>LOAMY SLOPE 8-10 P.Z.</b><br/>           Less productive site; occurs on steeper slopes</p> |
| R029XY114NV | <p><b>LOAMY FAN 8-12 P.Z.</b><br/>           LECI4-ACHY codominant grasses</p>                    |
| R029XY158NV | <p><b>COARSE LOAMY 8-10 P.Z.</b><br/>           ATCA2 codominant shrub</p>                        |
| R028BY005NV | <p><b>SANDY 8-10 P.Z.</b><br/>           ATCA2 codominant shrub; SPCR codominant grass</p>        |

Table 1. Dominant plant species

|            |   |
|------------|---|
| Tree       | Not specified   |
| Shrub      | (1) <i>Artemisia tridentata subsp. wyomingensis</i>                 |
| Herbaceous | (1) <i>Achnatherum hymenoides</i><br>(2) <i>Hesperostipa comata</i> |

## Physiographic features

The Loamy 8-10 P.Z. site occurs on fan remnants on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 15 percent are typical. Elevations range from 4000 to 7000 feet.

Table 2. Representative physiographic features

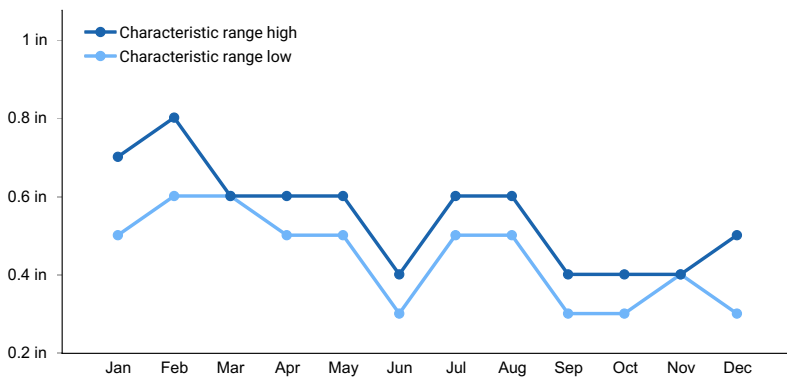
|                    |                                    |
|--------------------|------------------------------------|
| Landforms          | (1) Fan remnant<br>(2) Pediment    |
| Runoff class       | Very low to very high              |
| Flooding frequency | None                               |
| Ponding frequency  | None                               |
| Elevation          | 4,000–7,000 ft                     |
| Slope              | 0–30%                              |
| Water table depth  | 72 in                              |
| Aspect             | Aspect is not a significant factor |

## Climatic features

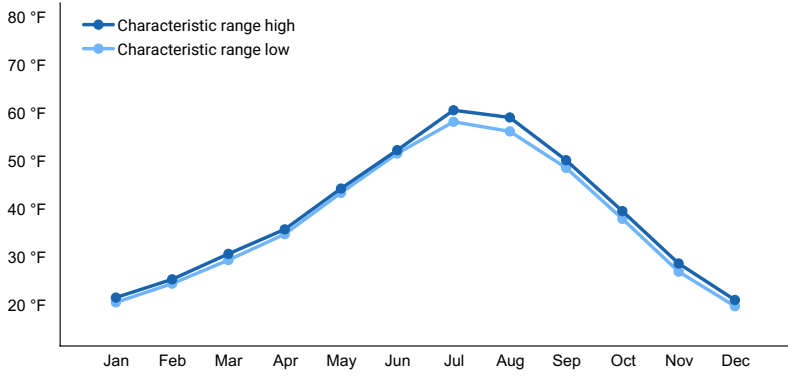
Average annual precipitation is 8 to 10 inches. Mean annual air temperature is 49 to 55 degrees F. The average growing season is about 120 to 170 days.

**Table 3. Representative climatic features**

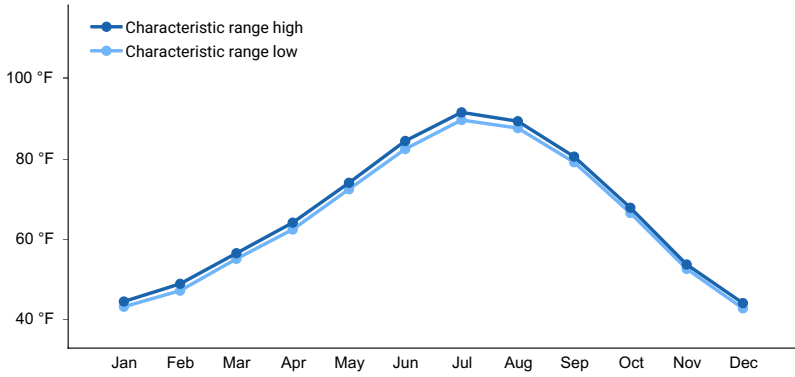
|  |              |
|--|--------------|
| Frost-free period (characteristic range)   | 111-122 days |
| Freeze-free period (characteristic range)  | 152-154 days |
| Precipitation total (characteristic range) | 6 in         |
| Frost-free period (actual range)           | 108-125 days |
| Freeze-free period (actual range)          | 151-155 days |
| Precipitation total (actual range)         | 5-7 in       |
| Frost-free period (average)                | 117 days     |
| Freeze-free period (average)               | 153 days     |
| Precipitation total (average)              | 6 in         |



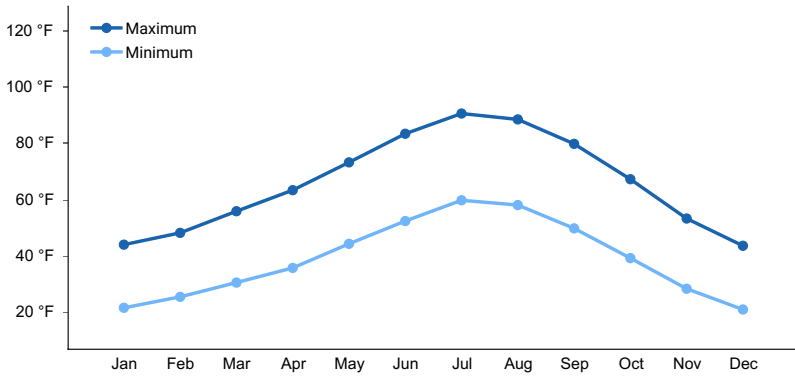
**Figure 1. Monthly precipitation range**



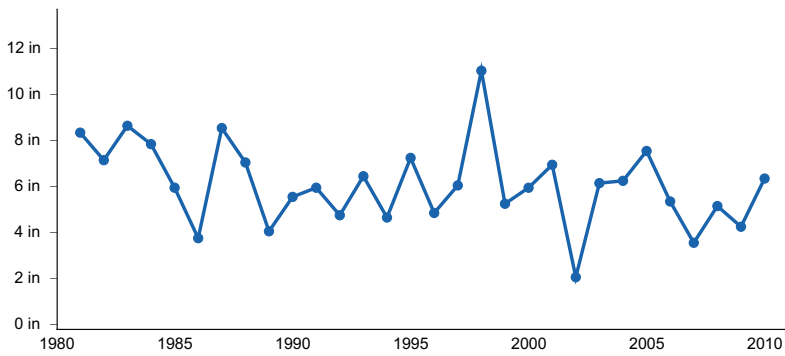
**Figure 2. Monthly minimum temperature range**



**Figure 3. Monthly maximum temperature range**



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



**Figure 5. Annual precipitation pattern**

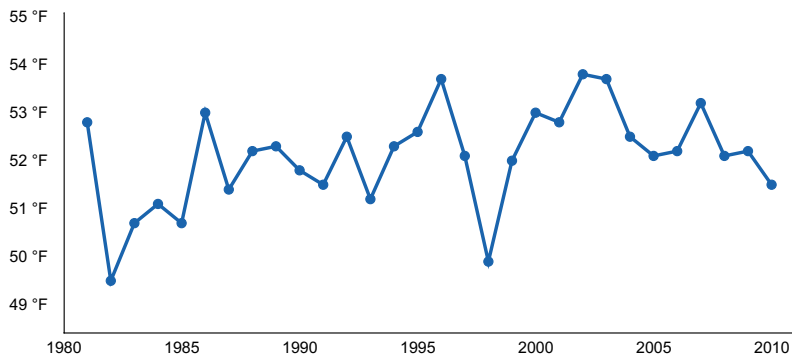


Figure 6. Annual average temperature pattern

### Climate stations used

- (1) GOLDFIELD [USC00263285], Goldfield, NV
- (2) TONOPAH [USW00023153], Tonopah, NV

### Influencing water features

There are no influencing water features associated with this site.

### Soil features

Soils are shallow to a duripan, well drained and formed in alluvium derived from volcanic parent material. The soil profile is characterized by a strongly cemented horizon within 50cm of the soil surface. The argillic horizon is characterized by 35-35% clay. Soil reaction increases with soil depth. Soil temperature is mesic and the soil moisture regime is aridic bordering on xeric.

The representative soil series associated with this ES is Handpah

Additional soil series associated with this site include Acoma, Breko, Cath, Devildog, Gabbvally, Handpah, Heist, Huilepass, Lojet, maderbak, Patter, Qwynn, Roval, Stampede, Timpahute, Truvar, Welder, Wellsed, Zadvar, and Zoda.

Table 4. Representative soil features

|  |  |
|--|--|
| Parent material                                    | (1) Alluvium-igneous rock  |
| Surface texture                                    | (1) Gravelly sandy loam<br>(2) Stony sandy loam<br>(3) Gravelly loam |
| Family particle size                               | (1) Loamy  |
| Drainage class                                     | Well drained to somewhat excessively drained                         |
| Permeability class                                 | Slow to moderately rapid   |
| Soil depth   | 10-20 in   |
| Surface fragment cover <=3"                        | 8-45%  |
| Surface fragment cover >3"                         | 0-5%   |
| Available water capacity (0-40in)                  | 0.3-2 in   |
| Calcium carbonate equivalent (Depth not specified) | 0-35%  |
| Electrical conductivity (0-40in)                   | 0-2 mmhos/cm   |
| Sodium adsorption ratio (0-40in)                   | 0-5  |

|  |        |
|--|--------|
| Soil reaction (1:1 water)<br>(0-40in)                    | 7.4-9  |
| Subsurface fragment volume <=3"<br>(Depth not specified) | 20-50% |
| Subsurface fragment volume >3"<br>(Depth not specified)  | 0-10%  |

## Ecological dynamics

Where management results in abusive livestock use, Wyoming big sagebrush and Douglas rabbitbrush increase while Indian ricegrass, needlegrasses, and fourwing saltbush decrease. Species likely to invade this site are annual forbs and grasses. Utah juniper readily invades this site where it occurs adjacent to juniper woodland areas. If Utah juniper canopies are allowed to close, they can eliminate understory vegetation. *Yucca* spp. typically occur in the eastern portion of MLRA 29.

### Fire Ecology:

The fire return interval for Wyoming big sagebrush communities range from is 10 to 70 years. Fire is the principal means of renewal for decadent stands of Wyoming big sagebrush. Wyoming big sagebrush establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. Fires in Wyoming big sagebrush communities are usually not continuous, and remnant plants are the principal means of postfire reproduction.

Fire top-kills or kills fourwing saltbush, depending upon ecotype. Fourwing saltbush may sprout after top-kill. Fourwing saltbush probably establishes primarily from seed after fire, with some populations also regenerating vegetatively. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Needle-and-thread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle-and-thread grass in sagebrush ecosystems is classified as slightly damaged by fire, and in intermountain rangelands, as severely damaged. Needle-and-thread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Desert needlegrass has persistent dead leaf bases, which make it susceptible to burning. Fire removes the accumulation; a rapid, cool fire will not burn deep into the root crown. Most perennial grasses have root crowns that can survive wildfire.

## State and transition model

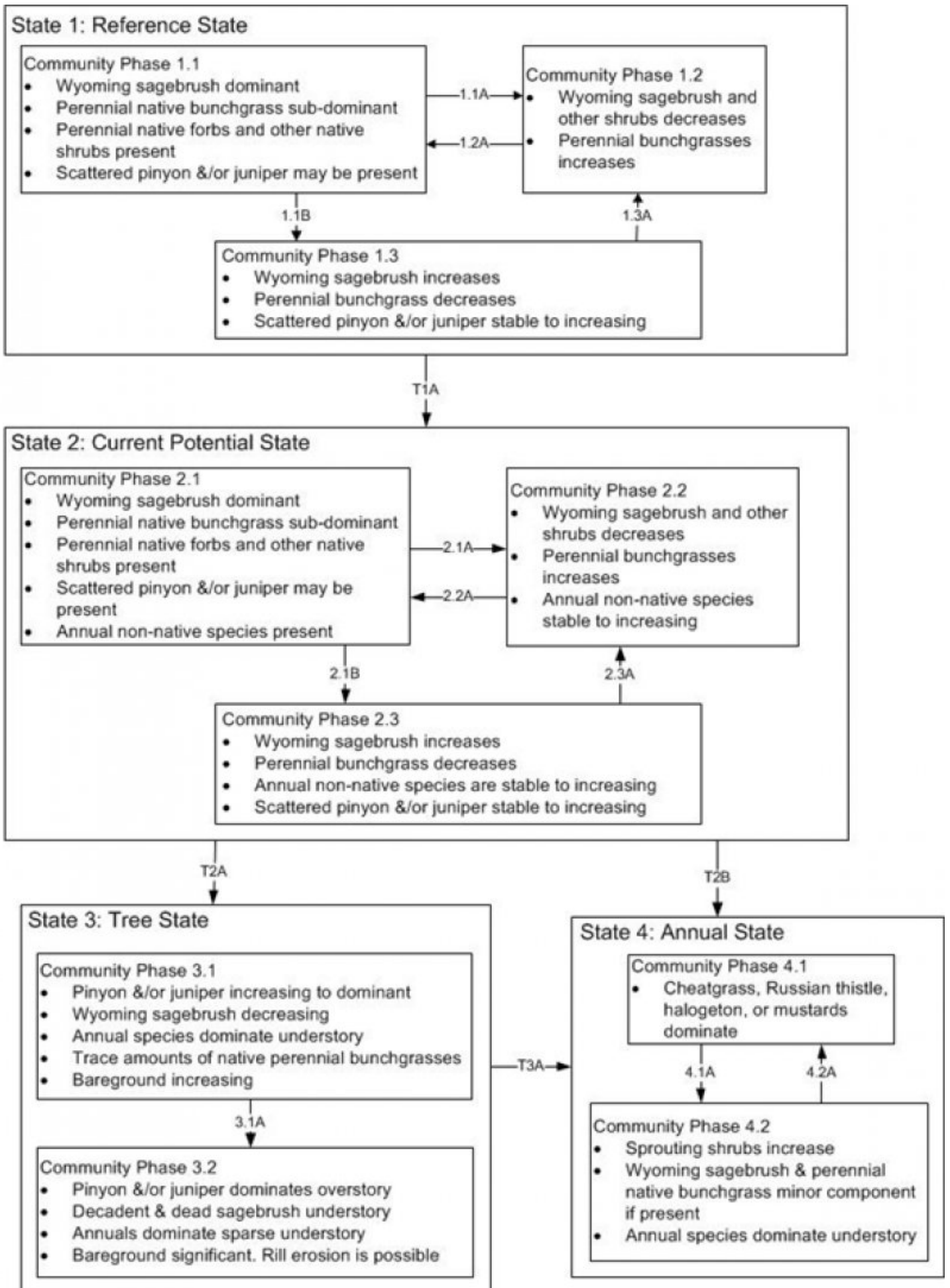


Figure 7. DRAFT STM

|   |
|---|
| <p>State 1: Representative of the reference conditions prior to Euro-American settlement in the west.</p> <p>1.1A: fire or other disturbance that removes sagebrush canopy</p> <p>1.1B: absence of disturbance and natural regeneration over time</p> <p>1.2A: absence of disturbance and natural regeneration over time</p> <p>1.3A: fire or other disturbance that removes sagebrush canopy</p> <p>T1A: introduction of non-native species</p> <p>State 2: Representative of the current potential with the presence of non-native annuals. Non-native annuals have the ability to significantly change disturbance regimes and nutrient cycling dynamics.</p> <p>2.1A: fire or other disturbance that removes sagebrush canopy</p> <p>2.1B: absence of disturbance and natural regeneration over time, may be coupled with inadequate rest and recovery from defoliation</p> <p>2.2A: absence of disturbance and natural regeneration over time</p> <p>2.3A: fire or other disturbance that removes sagebrush canopy</p> <p>T2A: long term absence of fire and natural regeneration of pinyon &amp; juniper trees</p> <p>T2B: reoccurring severe fire</p> <p>State 3: Dominated by pinyon and/or juniper trees. Changes in disturbance return intervals over the long term allows for pinyon and/or juniper to dominate the site by controlling site resources.</p> <p>3.1A: absence of disturbance and natural regeneration over time</p> <p>T3A: reoccurring severe fire</p> <p>State 4: Dominated by non-native annuals. Changes in disturbance return intervals and nutrient dynamics creating a positive feedback loop.</p> <p>4.1A: absence of disturbance and natural regeneration over time</p> <p>4.2A: fire or other disturbance that removed shrub canopy</p> |
|---|

Figure 8. DRAFT STM LEGEND

**State 1**  
**Tree State**

Dominated by pinyon and/or juniper trees. Changes in disturbance return intervals over the long term allows for pinyon and/or juniper to dominate the site by controlling site resources.



## **Community 1.1**

### **Utah juniper/Sagebrush/perennial grasses**

Utah juniper and/or pinyon dominate. Sagebrush is a minor component. Perennial grasses are present. Seeded species may be present. Annual non-native species present.

## **Community 1.2**

### **Utah juniper**

Utah juniper and/or pinyon dominate. Sagebrush is a minor component or missing. Perennial bunchgrasses are a minor component. Annual non-native species are present under the trees. Bare ground areas are large and connected. Soil redistribution is apparent.

## **Pathway 5.1a**

### **Community 1.1 to 1.2**

Time and lack of disturbance allows for tree maturation.

## **State 2**

### **Seeded State**

Site has been seeded with native or non-native perennial grasses. Forbs and shrubs may be present.

## **Community 2.1**

### **Non-native bunchgrass**

Non-native bunchgrass, such as crested wheatgrass, is dominant. Sagebrush may be present. Annual non-native species may be present.

## **Community 2.2**

### **Non-native bunchgrass/shrubs**

Non-native bunchgrass, such as crested wheatgrass, is dominant. Sagebrush has increased from Community Phase 6.1. Annual non-native species may be present.

## **Community 2.3**

### **Sagebrush/non-native perennial bunchgrass (at-risk)**

Sagebrush is dominant. Non-native perennial bunchgrass has decreased. Annual non-native species have increased. Utah juniper and/or pinyon may be present.

## **Pathway P**

### **Community 2.1 to 2.2**

## **Pathway P**

### **Community 2.2 to 2.1**

## **Pathway P**

### **Community 2.2 to 2.3**

## **Pathway P**

### **Community 2.3 to 2.1**

## **Restoration pathway R5A**

### **State 1 to 2**

Tree removal and seeding of desired species.

## **Transition T6B**

### **State 2 to 1**

Time and a lack of fire allows for trees to dominate site; may be coupled with inappropriate grazing management.

## **Additional community tables**

### **Animal community**

#### **Livestock Interpretations:**

This site is suited for grazing by cattle and sheep during the spring, early summer and fall. Grazing management should be keyed to Indian ricegrass, needleandthread grass, desert needlegrass, and other perennial grass production. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth. Needleandthread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Young desert needlegrass is palatable to all classes of livestock. Mature herbage is moderately grazed by horses and cattle, but rarely grazed by sheep. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. Fourwing saltbush is one of the most palatable shrubs in the West. Its protein, fat, and carbohydrate levels are comparable to alfalfa. It provides nutritious forage for all classes of livestock. Palatability is rated as good for domestic sheep and domestic goats; fair for cattle; fair to good for horses in winter, poor for horses in other seasons.

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:**

Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. Fourwing saltbush provides valuable habitat and year-round browse for wildlife. Fourwing saltbush also provides browse and shelter for small mammals. Additionally, the browse provides a source of water for black-tailed jackrabbits in arid environments. Granivorous birds consume the fruits. Wild ungulates, rodent and lagomorphs readily consume all aboveground portions of the plant. Palatability is rated good for deer, elk, pronghorn and bighorn sheep. Indian ricegrass is eaten by pronghorn in "moderate" amounts whenever available. In Nevada it is consumed by desert bighorns. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. In Nevada, Indian ricegrass may even dominate jackrabbit diets during the spring through early summer months. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. Young desert needlegrass is palatable to many species of wildlife. Desert needlegrass produces considerable basal foliage and is good forage while young. Desert bighorn sheep graze desert needlegrass.

### **Hydrological functions**

Runoff varies from very low to very high. Permeability is very slow to moderately rapid. A few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt. Water flow patterns are rare but can be expected in areas subjected to summer convection storms or rapid snowmelt.

Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and

head cuts associated with ephemeral channel entrenchment are common. Gullies and head cuts should be healing or stable. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass] 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 diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

## Other products

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. Fourwing saltbush is traditionally important to Native Americans. They ground the seeds for flour. The leaves, placed on coals, impart a salty flavor to corn and other roasted food. Top-growth produces a yellow dye. Young leaves and shoots were used to dye wool and other materials. The roots and flowers were ground to soothe insect bites. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source.

## 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. Fourwing saltbush is widely used in rangeland and riparian improvement and reclamation projects, including burned area recovery. It is probably the most widely used shrub for restoration of winter ranges and mined land reclamation. Needleandthread grass is useful for stabilizing eroded or degraded sites.

## Inventory data references

NASIS data used to populate abiotic tables.

## Type locality

|                            |   |
|----------------------------|---|
| Location 1: Nye County, NV |   |
| Township/Range/Section     | T3N R47E S1   |
| General legal description  | Stone Cabin Valley, Nye County, Nevada.                                     |
| Location 2: Nye County, NV |   |
| Township/Range/Section     | T6N R49E S23  |
| General legal description  | Stone Cabin Valley, Nye County, Nevada.                                     |
| Location 3: Nye County, NV |   |
| Township/Range/Section     | T11N R54E S34   |
| General legal description  | Little Smokey Valley, Nye County, Nevada.                                   |
| Location 4: Nye County, NV |   |
| Township/Range/Section     | T8N R44E S15  |
| General legal description  | Along road leading east from Manhattan, Ralston Valley, Nye County, Nevada. |
| Location 5: Nye County, NV |   |
| Township/Range/Section     | T8N R44E S23  |
| General legal description  | Along road leading east from Manhattan, Ralston Valley, Nye County, Nevada. |

## Other references

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

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

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

## Contributors

HA/GD

## Approval

Kendra Moseley, 2/20/2025

## Rangeland health reference sheet

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

|   |                                       |
|---|---------------------------------------|
| Author(s)/participant(s)                    | Patti Novak-Echenique                 |
| Contact for lead author                     | State Rangeland Management Specialist |
| 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:** Rills are none to rare. A few (short <1 m and stable) may occur on steeper slopes after summer convection storms.

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- 2. Presence of water flow patterns:** Water flow patterns are none to rare. A few (short <2 m and stable) may occur on steeper slopes after summer convection storms.

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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 is variable (30-50%) 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. Areas of this site occurring on soils that have a physical crust will probably have stability values less than 3. (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 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. 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 [i.e., Indian ricegrass] 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. Platy or massive sub-surface horizons or subsoil argillic horizons are not to be interpreted as compacted layers.

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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: Wyoming big sagebrush>>associated shrubs>shallow-rooted, cool season, perennial bunchgrasses>deep-rooted, cool season, perennial forbs=fibrous, shallow-rooted, cool season, perennial and annual forbs

Other: evergreen trees, succulents

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Reference Plant Community: 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 (<20%) have dead

centers.

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14. **Average percent litter cover (%) and depth ( in):** Within plant interspaces 20-30% and depth of litter is  $< \frac{1}{2}$  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 (end of June)  $\pm 600$  lbs/ac; Favorable years  $\pm 800$  lbs/ac and unfavorable years  $\pm 300$  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 halogeton, Russian thistle, bassia, annual mustards and cheatgrass.
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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.
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