

Ecological site R026XY002NV WET SODIC BOTTOM

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 026X—Carson Basin and Mountains

The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark the western boundary of this area. Elevations range from about 3,806 feet (1,160 meters) on the west shore of Pyramid Lake to 11,653 feet (3,552 meters) on the summit of Mount Patterson in the Sweetwater Mountains.

Valley areas are dominantly composed of Quaternary alluvial deposits with Quaternary playa or alluvial flat deposits often occupying the lowest valley bottoms in the internally drained valleys, and river deposited alluvium being dominant in externally drained valleys. Hills and mountains are dominantly Tertiary andesitic flows, breccias, ash flow tuffs, rhyolite tuffs or granodioritic rocks. Quaternary basalt flows are present in lesser amounts, and Jurassic and Triassic limestone and shale, and Precambrian limestone and dolomite are also present in very limited amounts. Also of limited extent are glacial till deposits along the east flank of the Sierra Nevada Mountains, the result of alpine glaciation.

The average annual precipitation in this area is 5 to 36 inches (125 to 915 millimeters), increasing with elevation. Most of the rainfall occurs as high-intensity, convective storms in spring and autumn. Precipitation is mostly snow in winter. Summers are dry. The average annual temperature is 37 to 54 degrees F (3 to 12 degrees C). The freeze-free period averages 115 days and ranges from 40 to 195 days, decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or smectitic mineralogy. They generally are well drained, are clayey or loamy and commonly skeletal, and are very shallow to moderately deep.

This area supports shrub-grass vegetation characterized by big sagebrush. Low sagebrush and Lahontan sagebrush occur on some soils. Antelope bitterbrush, squirreltail, desert needlegrass, Thurber needlegrass, and Indian ricegrass are important associated plants. Green ephedra, Sandberg bluegrass, Anderson peachbrush, and several forb species also are common. Juniper-pinyon woodland is typical on mountain slopes. Jeffrey pine, lodgepole pine, white fir, and manzanita grow on the highest mountain slopes. Shadscale is the typical plant in the drier parts of the area. Sedges, rushes, and moisture-loving grasses grow on the wettest parts of the wet flood plains and terraces. Basin wildrye, alkali sacaton, saltgrass, buffaloberry, black greasewood, and rubber rabbitbrush grow on the drier sites that have a high concentration of salts.

Some of the major wildlife species in this area are mule deer, coyote, beaver, muskrat, jackrabbit, cottontail, raptors, pheasant, chukar, blue grouse, mountain quail, and mourning dove. The species of fish in the area include trout and catfish. The Lahontan cutthroat trout in the Truckee River is a threatened and endangered species.

LRU notes

The Semiarid Fans and Basins LRU includes basins, alluvial fans and adjacent hill slopes immediately east of the Sierra Nevada mountain range and are affected by its climate or have its granitic substrate. Elevations range from 1355 to 1920 meters and slopes range from 0 to 30 percent, with a median value of 6 percent. Frost free days range from 121 to 170.

Ecological site concept

This site occurs along floodplains, lake terrace, and lake plains. Slopes are generally from 0 to 2 percent. Elevations are 3900 to 6000 feet. The soils associated with this site are very deep and poorly to somewhat poorly drained. The soils are usually saturated with water during late winter and spring. During drier periods, the water table lowers to depths greater than 60 inches. Plants which are tolerant of severe saline-alkali conditions, excess moisture and propagate vegetatively are best adapted to these soils. The dominant plant is inland salt grass (*Distichlis spicata*).

Associated sites

R026XY004NV	SALINE BOTTOM
R026XY012NV	DRY FLOODPLAIN 8-10 P.Z.
R026XY021NV	SODIC FLAT

Similar sites

R026XY013NV	SODIC FLOODPLAIN SPAI-DISP codominant grasses
R026XY021NV	SODIC FLAT SAVE4 dominant plant on site; less productive site
R026XY004NV	SALINE BOTTOM LECI4 dominant grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Distichlis spicata</i>

Physiographic features

This site occurs along floodplains, lake terrace, and lake plains. Slopes are generally from 0 to 2 percent. Elevations are 3900 to 6000 feet.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Lake terrace (3) Lake plain
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Rare to frequent
Ponding duration	Long (7 to 30 days)

Ponding frequency	None to frequent
Elevation	1,189–1,829 m
Slope	0–2%
Water table depth	0–46 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 6 to 10 inches. Mean annual air temperature is 46 to 51 degrees F. The average growing season is about 90 to 130 days.

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. 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, with the result that 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 mid-latitude 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 scattered thundershowers. The eastern portion of the state receives significant 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).

Table 3. Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	152-254 mm
Frost-free period (average)	110 days
Freeze-free period (average)	
Precipitation total (average)	203 mm

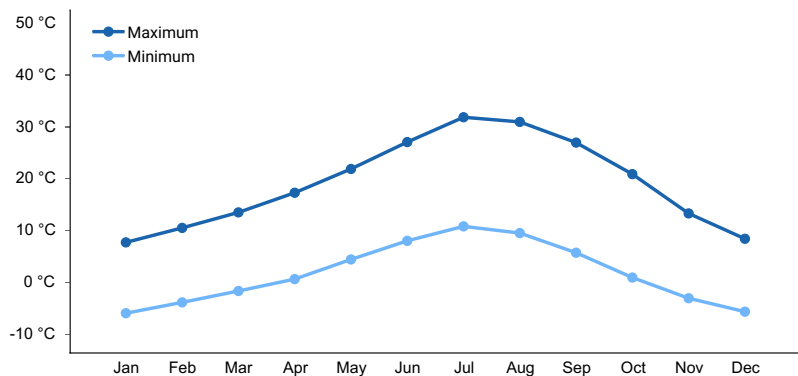


Figure 1. Monthly average minimum and maximum temperature

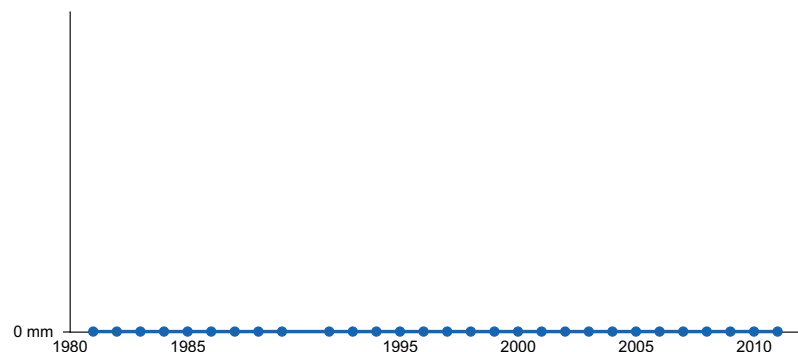


Figure 2. Annual precipitation pattern

Influencing water features

This site has a high water table and is rarely to frequently flooded.

Soil features

The soils associated with this site are very deep and poorly to somewhat poorly drained. Available water capacity is very low to high. Runoff is negligible to very high. The soils are usually saturated with water during late winter and spring. During drier periods, the water table lowers to depths greater than 60 inches. Plants which are tolerant of severe saline-alkali conditions, excess moisture and propagate vegetatively are best adapted to these soils. Soil series associated with this site include: Louderback, Orizaba, Parran, Truckee, Twojayay, Umlerland, and Voltaire.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits (2) Alluvium
Surface texture	(1) Silty clay loam
Family particle size	(1) Sandy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to rapid
Soil depth	183–213 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.49–21.08 cm
Calcium carbonate equivalent (0-101.6cm)	1–25%

Electrical conductivity (0-101.6cm)	16–32 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	46–90
Soil reaction (1:1 water) (0-101.6cm)	7.9–9.6
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Where management results in abusive livestock use, rubber rabbitbrush, seepweed, and black greasewood become dominant. Species most likely to invade this site are annuals.

Fire Ecology:

Saltgrass rhizomes occur deep in the soil where they are insulated from the heat of most fires. Saltgrass survives fire by sending up new growth from rhizomes.

State and Transition Model Narratives

Reference State 1:

The Reference State represents the plant communities and ecological dynamics of sites that have a water table typically less than 30 inches to the soil surface. The Reference State is generally dominated by saltgrass. Depending on the site, it may be dominated by another grass or grass-like species.

Community Phase 1.1

This community is characterized by an open grassland with saltgrass or other grass/grass-like plants. The water table is typically less than 30 inches deep, but may fluctuate through the year.

T1A: Transition from Reference State 1 to Current Potential State 2

The transition from State 1 to State 2 occurs after the introduction of non-native plants.

Current Potential State 2:

The current potential state is similar to the reference state, however invasive grasses and/ or forbs are now present in all community phases. This state still has the visual aspect of a saltgrass meadow. Foxtail barley, arctic rush and alkali bluegrass are other primary perennial grass or grasslike species present. Fivehorn bassia, povertyweed and other less palatable species now make up a large portion of the herbaceous layer. Primary disturbance mechanisms include native herbivore and domestic livestock grazing. Timing of these disturbances dictates the ecological dynamics that occur. The current potential

state is still self sustaining; but is losing resistance to change due to lower resilience following disturbances. When disturbances occur, the rate of recovery is variable depending on severity.

Indicators: A community dominated by saltgrass and arctic rush where other native perennial grasses and forbs are also present. Invasive grasses and/or forbs are present.

Feedbacks: Frequent disturbances that may allow annual invasive species such as fivehook bassia to dominate.

At-risk Community Phase: As increased disturbance frequency allows for the increase and/or dominance of annual grasses and forbs, this community is at greater risk.

Trigger: Reoccurring disturbance that results in a dominance of annual grasses and/or forbs in the herbaceous layer.

Community Phase 2.1

This community is characterized by an open grassland aspect with saltgrass, arctic rush, and foxtail still dominating the herbaceous layer. Other commonly occurring grasses and grasslikes include Kentucky bluegrass, alkali

bluegrass, spikerush, and tufted hairgrass. Non-native species including fivehorn bassia, poverty weed, and/or salt cedar are also present. A stable water table is present at 30 inches or less, providing season long moisture for plant growth.

T2A Transition from State 2 to State 3

The transition occurs after site is converted for hayland use and non-native species are planted.

Altered State 3

The Altered State occurs when the site is converted to hayland. Alfalfa is a typical plant used for hay, although other species may occur.

Community Phase 3.1

Alfalfa dominant plant. Site is managed more intensely than under natural conditions. The water table may be altered from natural decisions.

State and transition model

State and Transition Model

State: Nevada

Site Type: Rangeland

MLRA: 026- Carson Basin

Wet meadow/bottom sites influenced by salts

R026XY002NV, R026XF016CA, R026XF007CA, R026XF065CA

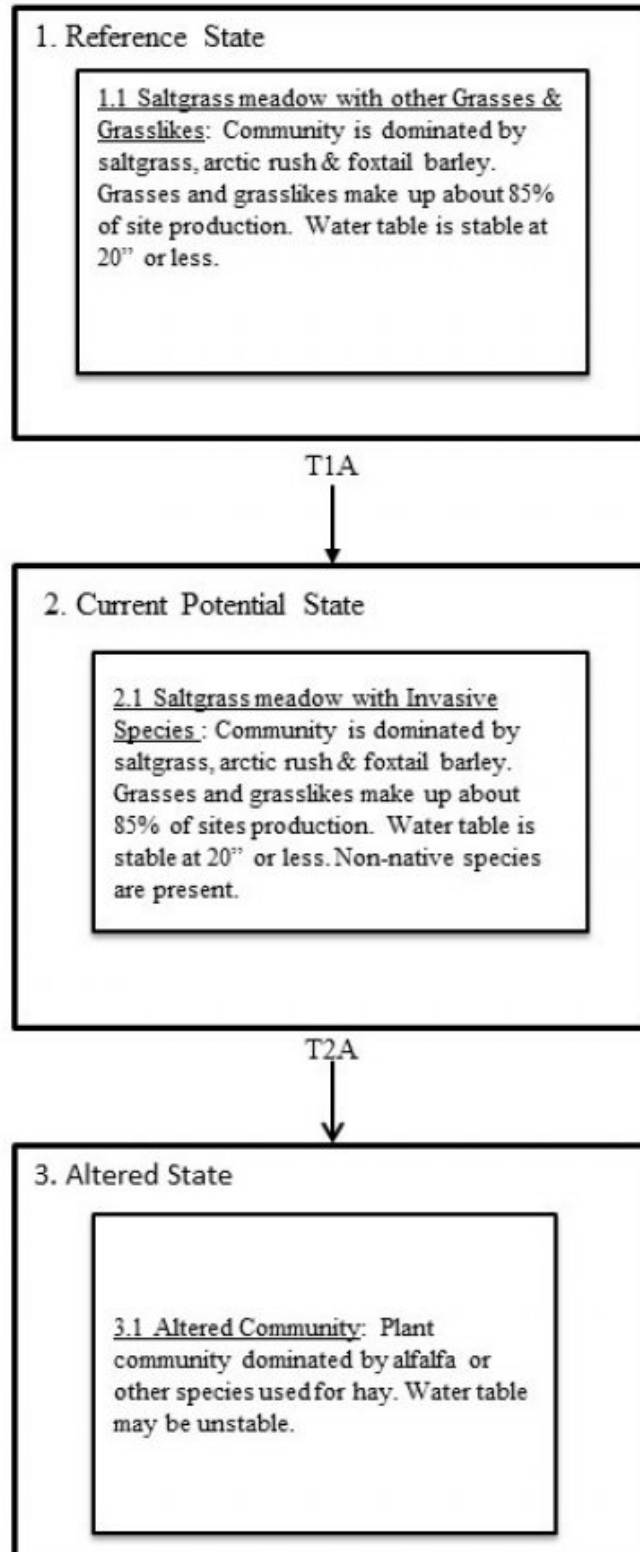


Figure 4. General STM for wet sites influenced by salt.

Reference Plant Community

Community 1.1

Reference Plant Community

The reference plant community is dominated by inland saltgrass. Potential vegetative composition is about 90% grasses and grass-like plants, 5% forbs and 5% shrubs. Approximate ground cover (bale and crown) is 60 to 80 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1009	1715	2018
Forb	56	95	112
Shrub/Vine	56	95	112
Total	1121	1905	2242

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			1143–1715	
	saltgrass	DISP	<i>Distichlis spicata</i>	1143–1715	–
2	Secondary Perennial Grasses			38–152	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	10–38	–
	beardless wildrye	LETR5	<i>Leymus triticoides</i>	10–38	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	10–38	–
Forb					
3	Perennial			19–95	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	10–38	–
4	Annual			19–57	
	beardless wildrye	LETR5	<i>Leymus triticoides</i>	10–38	–
Shrub/Vine					
5	Secondary Shrubs			38–152	
	iodinebush	ALOC2	<i>Allenrolfea occidentalis</i>	19–57	–
	Torrey's saltbush	ATTO	<i>Atriplex torreyi</i>	19–57	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	19–57	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	19–57	–
	seepweed	SUAED	<i>Suaeda</i>	19–57	–

Animal community

Livestock Interpretations:

This site is suited for livestock grazing. Grazing management should be keyed to inland saltgrass. Saltgrass's value as forage depends primarily on the relative availability of other grasses of higher nutritional value and palatability. It can be an especially important late summer grass in arid environments after other forage grasses have deceased. Saltgrass is rated fair to good as a forage species only because it stays green after most other grasses dry.

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:

Saltgrass provides cover for a variety of bird species, small mammals, and arthropods and is on occasion used as forage for several big game wildlife species.

Hydrological functions

Runoff is negligible to very high. Permeability is very slow to rapid.

Recreational uses

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

Other information

Given its extensive system of rhizomes and roots which form a dense sod, saltgrass is considered an outstanding species for controlling wind and water erosion.

Type locality

Location 1: Douglas County, NV	
Township/Range/Section	T14N R20E S9
General legal description	About 7 miles south of Carson City on east side of HWY 395, Carson River floodplain, Douglas County, Nevada. This site also occurs in Carson City, Lyon, Mineral, Storey and Washoe Counties, Nevada.

Other references

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

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

Contributors

DK/FR/GKB

Approval

Kendra Moseley, 4/10/2024

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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	07/12/2012

Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** Waterflow patterns are rare to common dependent on location relative to major inflow areas. Waterflow patterns are typically short, ending in depressional areas where water ponds. Moderately fine to fine surface textures and physical crusts result in limited infiltration rates. Concentrations of surface salts and sodium result in chemical crusts which also impede precipitation infiltration.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 10-20%

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

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

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

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values will range from 1 to 4. (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 single grained or subangular blocky. Soil surface colors are dark browns and soils are typified by a mollic or ochric epipedon. Organic matter 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:** Perennial grasses and grass-likes slow runoff and increase infiltration

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 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: rhizomatous perennial grasses (salt grass) and grass-likes > salt-desert shrubs

Sub-dominant: deep rooted, cool season, perennial forbs > cool-season perennial bunchgrasses = warm-season perennial bunchgrasses > annual forbs

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead stems within rhizomatous perennial grasses and grass-likes may show up to 30% mortality
-

14. **Average percent litter cover (%) and depth (in):** Under canopy and between plant interspaces (50-60%) and depth of litter is $\pm\frac{1}{4}$ inch.
-

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (March thru mid-May) ± 1700 lbs/ac, Favorable years 2000 lbs/ac and unfavorable years 1000 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, cheatgrass, mustards and salt cedar.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years.
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