Ecological site R027XY009NV
SANDY 5-8 P.Z.

Last updated: 6/03/2024
Accessed: 09/18/2026

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): 027X–Fallon-Lovelock Area

Physiography Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years. The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters). Geology Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA. Climate The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation. Water The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout. Soils The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly a mesic temperature regime, aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum. Biological Resources This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey’s greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

Ecological site concept

Sandy 5-8 P.Z. occurs on sand sheets of lower piedmont slopes, dunes, beach terraces, alluvial fans, lake plains, lake terraces, fan skirts and lake plains on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 8 percent are most typical. Elevations are 3800 to 6000 feet. Soils associated with this site are typically very deep sands of mixed origin. The surface soil texture is typically fine or very fine sand.

Associated sites

R027XY014NV	**COARSE SILTY 4-8 P.Z.** KRLA2 dominant shrub; ATCA2 minor shrub; soils not Psamments.
R027XY060NV	**SANDY 3-5 P.Z.** LYSH major shrub; lower elevations; less productive site.

Similar sites

R027XY045NV	**SANDY 8-10 P.Z.** ARTR2 dominant shrub.
R027XY053NV	**DUNES 8-10 P.Z.** ARTRT2 important shrub; occurs on sand hill (dune) landform.
R027XY016NV	**SODIC DUNES** SAVE4 dominant shrub; ATCA2 minor shrub; occurs on sand hill (dune) landform.
R027XY023NV	**DUNES 4-8 P.Z.** TETE4 dominant shrub; occurs on sand hill (dune) landform.
R027XY012NV	**SODIC SANDS** SAVE4 dominant shrub; ATCA2 minor shrub, if present.
R029XY012NV	**SANDY 5-8 P.Z.** SPCR codominant grass; PLJA important grass.
R027XY050NV	**COARSE GRAVELLY LOAM 4-8 P.Z.** SABA14 dominant shrub; ATCA2 minor shrub, if present; ATCO important shrub.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

Sandy 5-8 P.Z. occurs on sand sheets of lower piedmont slopes, dunes, beach terraces, alluvial fans, lake plains, lake terraces, fan skirts and lake plains on all exposures. Slopes range from 0 to 30 percent, but slope gradients of 2 to 8 percent are most typical. Elevations are 3800 to 6000 feet.

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Fan piedmont (3) Dune
Runoff class	Very low to very high
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare
Ponding frequency	None
Elevation	1,160 – 1,830 m
Slope	0 – 30 %
Water table depth	180 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is semiarid, characterized by cool, moist winters, and hot, dry summers. Average annual precipitation is 5 to 8 inches. Mean annual air temperature is 47 to 55 degrees F. The average growing season is about 90 to 160 days.

Table 3 Representative climatic features

Frost-free period (average)	160 days
Freeze-free period (average)	
Precipitation total (average)	200 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils associated with this site are typically very deep sands of mixed origin. Other soils with a thick layer (greater than 20 inches) of overblown or alluvial sand may also be in this site. The surface soil texture is typically fine or very fine sand typically greater than 7 inches in depth to a soil textural change (i.e. sand to sandy loam) and/or a change in soil structure (i.e. single-grained to platy). These soils have rapid infiltration and percolation rates, low to moderate available water capacity and are well drained to somewhat excessively drained with very low to very high runoff. Potential for sheet and rill erosion is slight, but wind erosion potential is high. Soil stability values should be 1 to 4 on the sandy soil textures found on this site. The soil series associated with this site are Cleaver, Downeyville, Essal, Hawsley, Patna, Rawe, Ruhe, Rusty, Stumble, Theon, Tipperary, Tresed, and Yerington.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Eolian deposits (3) Lacustrine deposits
Surface texture	(1) Loamy fine sand (2) Coarse sand (3) Fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Slow to moderate
Soil depth	180 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	2.29 – 15.49 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 30 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 9.6
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

As ecological condition declines, Nevada dalea, Bailey's greasewood, and littleleaf horsebrush increase while Indian ricegrass, fourwing saltbush, winterfat, and needleandthread decrease. With further site degradation, Bailey's greasewood may dominate the plant community. In areas where a relatively shallow ground water table (less than about 30 feet) occurs, black greasewood is frequently associated with this plant community. Species likely to invade this site are cheatgrass, Douglas' rabbitbrush, horsebrush, snakeweed, halogeton, annual mustards and Russian thistle.

Fire Ecology:
Sustained surface fire top-kills or kills fourwing saltbush depending upon ecotype. Fourwing saltbush is fire-resistant compared to most associated shrubs. The salt scurf layer on leaves inhibits burning. Fourwing saltbush may sprout after top-kill. Some ecotypes fail to sprout, or show only a weak sprouting response. Generally, fourwing saltbush is poorly adapted to frequent fire.
Winterfat is either killed or top-killed by fire, depending on fire severity. Severe fire can kill the perennating buds located several inches above the ground surface and thus kills the plant. In addition, severe fire usually destroys seed on the plant. Low-severity fire scorches or only partially consumes the aboveground portions of winterfat and thus does not cause high mortality. Fires in spiny hopsage sites generally occur in late summer when plants are dormant, and sprouting generally does not occur until the following spring. Spiny hopsage is considered to be somewhat fire tolerant and often survives fires that kill sagebrush. Mature spiny hopsage generally sprout after being burned. Spiny hopsage is reported to be least susceptible to fire during summer dormancy. Communities in which Nevada dalea occur rarely burn, thus Nevada dalea has little adaptations to fire and is probably killed. Indian ricegrass plants are generally killed by fire. Indian ricegrass regenerates from seed following fire. Rapid postfire responses such as these suggest that Indian ricegrass may also sprout from tillers. Needleandthread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread grass is classified as slightly to severely damaged by fire. Needleandthread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			222-429	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	196-353	–
	needle and thread	HECO26	*Hesperostipa comata*	26-76	–
2	**Secondary Perennial Grasses**			10-40	
	squirreltail	ELEL5	*Elymus elymoides*	2-16	–

	tufted wheatgrass	ELMA7	*Elymus macrourus*	2-16	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	2-16	–
Forb					
3	**Perennial**			10-40	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	2-16	–
	evening primrose	OENOT	*Oenothera*	2-10	–
	beardtongue	PENST	*Penstemon*	2-10	–
	globemallow	SPHAE	*Sphaeralcea*	2-10	–
4	**Annual**			10-26	
Shrub/Vine					
5	**Primary Perennial Shrubs**			142-260	
	fourwing saltbush	ATCA2	*Atriplex canescens*	112-168	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	10-40	–
	Nevada dalea	PSPO	*Psorothamnus polydenius*	10-26	–
	spiny hopsage	GRSP	*Grayia spinosa*	10-26	–
6	**Secondary Perennial Shrubs**			11-56	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	2-16	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2-16	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	2-16	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	2-16	–
	Bailey's greasewood	SABA14	*Sarcobatus baileyi*	2-16	–
	horsebrush	TETRA3	*Tetradymia*	2-16	–

Animal community

Livestock Interpretations: This site is suitable for cattle and sheep grazing. Grazing management should be keyed to indian ricegrass, needleandthread grass, winterfat, and fourwing saltbush production. 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, and poor for horses in other seasons. Indian ricegrass has good forage value for domestic sheep, cattle, and horses. It can be important cattle forage in winter, particularly in salt desert communities. Indian ricegrass is often used most heavily in late winter, when succulent and nutritious new green leaves are produced. It supplies a source of green feed before most other native grasses have produced much new growth. Consequently, Indian ricegrass is often heavily grazed before animals leave winter ranges. 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. Winterfat is an important forage plant for livestock, especially during winter when forage is scarce. Abusive grazing practices have reduced or eliminated winterfat on some areas even though it is fairly resistant to browsing. Effects depend on severity and season of grazing. Spiny hopsage provides a palatable and nutritious food source for livestock, particularly during late winter through spring. Domestic sheep browse the succulent new growth of spiny hopsage in late winter and early spring. Nevada dalea is of little importance to livestock due to its low palatability. 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: 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, including quail, grouse, and gray partridge, consume the fruits. Wild ungulates, rodents, and lagomorphs readily consume all aboveground portions of the plant. Palatability is rated good for deer, pronghorn, and bighorn sheep. Winterfat is an important forage plant for Wildlife, especially during winter when forage is scarce. Winterfat seeds are eaten by rodents. Winterfat is a staple food for black-tailed jackrabbit. Mule deer and pronghorn antelope browse winterfat. Winterfat is used for cover by rodents. It is potential nesting cover for upland game birds, especially when grasses grow up through its crown. Spiny hopsage provides a palatable and nutritious food source for livestock, particularly during late winter through spring. Domestic sheep browse the succulent new growth of spiny hopsage in late winter and early spring. Nevada dalea has low palatability to many wildlife species. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available and in Nevada it is consumed by desert bighorns. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available.

Hydrological functions

Potential for sheet and rill erosion is slight, a few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt. Wind erosion potential is high. Water flow patterns are none to rare on this site. Pedestals are rare with occurrence typically limited to areas affected by wind scouring. 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 ephermal channel entrenchment are common. Gullies and head cuts should be healing or stable. Fine litter (foliage from grasses and annual and perennial forbs) are expected to move the distance of slope length during intense summer storms. Persistent litter (large woody material) will remain in place except during catastrophic events. 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 site.

Recreational uses

This site offers rewarding opportunities to photographers and for nature study. This site has potential for off-road vehicle use and hiking.

Other products

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. Branch ashes were added to blue corn dough to make green bread. The roots and flowers were ground to soothe insect bites. Indian ricegrass seeds make a gluten-free, nutritious flour with a potentially good market. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. Indian ricegrass was traditionally eaten by some Native American people. The Paiutes used seed as a reserve food source. The large-seeded panicle is often used in dry floral arrangements.

Other information

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. Fourwing saltbush is drought and cold resistant, palatable, relatively easy to establish with artificial regeneration, and establishes on harsh (and even toxic) sites. Fourwing saltbush is adaptable on sites with declining water tables, brackish groundwater, or saline soils. The deep roots help stabilize erodible soils. It can facilitate establishment of native shrubs, such as sagebrush, that are more resistant to artificial regeneration. Winterfat adapts well to most site conditions, and its extensive root system stabilizes soil. However, winterfat is intolerant of flooding, excess water, and acidic soils. Spiny hopsage has moderate potential for erosion control and low to high potential for long-term revegetation projects. It can improve forage, control wind erosion, and increase soil stability on gentle to moderate slopes. Spiny hopsage is suitable for highway plantings on dry sites in Nevada. Indian ricegrass is well-suited for surface erosion control and desert revegetation although it is not highly effective in controlling sand movement. Indian ricegrass can be useful in the reclamation of many arid and semiarid areas in the western United States. Typical sites include those in which vegetation has been removed due to surface mining, construction activity, brush control, heavy grazing, or fire. Indian ricegrass can be used for revegetating degraded rangelands in areas of low precipitation and has naturally revegetated overgrazed ranges. Needleandthread grass is useful for stabilizing eroded or degraded sites.

Inventory data references

NASIS data for Physiographic and Soils sections.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T16 N R30 E S17
General legal description	Bass Flat area, Churchill County, Nevada.
Location 2: Pershing County, NV	
Township/Range/Section	T26 N R27 E S24

General legal description	Granite Springs Valley area, Pershing County, Nevada. This site also occurs in Lyon and Mineral county, Nevada.

Other references

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

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

Contributors

DB/GED

Approval

Kendra Moseley, 6/03/2024

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	06/20/2006
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills: Rills are rare. A few 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 none to rare.**

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas affected by wind scouring.

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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 ± 80%; surface rock fragments less than 15%; shrub canopy 10-20%; basal area for perennial herbaceous plants ± 5%.

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5. **Number of gullies and erosion associated with gullies:** 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.

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

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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) is expected to move the distance of slope length during intense summer storms. Persistent litter (large woody material) will remain in place except during catastrophic 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 1 to 4 on the sandy soil textures found on this site. (This will 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 single grain. Soil surface colors are light and the soils are typified by an ochric epipedon. Organic carbon 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):** None

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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: Reference Plant Community: Deep-rooted, cool season, perennial bunchgrasses >> fourwing saltbush. (By above ground production)

Sub-dominant: Associated shrubs > shallow-rooted, cool season, perennial grasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, annual and perennial forbs. (By above ground production)

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 are 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):** **Between plant interspaces (± 10%) and depth of litter is ±½ 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 (March thru May) ± 450 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:** **Cheatgrass, halogeton, Russian thistle, snakeweed, and annual mustards are invaders on this site. Douglas rabbitbrush and horsebrush are increasers on this site.**

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