Ecological site R024XY055NV
SANDY 5-8 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): 024X–Humboldt Basin and Range Area

Major land resource area (MLRA) 24, the Humboldt Area, covers an area of approximately 8,115,200 acres (12,680 sq. mi.). It is found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Elevations range from 3,950 to 5,900 feet (1,205 to 1,800 meters) in most of the area, some mountain peaks are more than 8,850 feet (2,700 meters). A series of widely spaced north-south trending mountain ranges are separated by broad valleys filled with alluvium washed in from adjacent mountain ranges. Most valleys are drained by tributaries to the Humboldt River. However, playas occur in lower elevation valleys with closed drainage systems. Isolated ranges are dissected, uplifted fault-block mountains. Geology is comprised of Mesozoic and Paleozoic volcanic rock and marine and continental sediments. Occasional young andesite and basalt flows (6 to 17 million years old) occur at the margins of the mountains. Dominant soil orders include Aridisols, Entisols, Inceptisols and Mollisols. Soils of the area are generally characterized by a mesic soil temperature regime, an aridic soil moisture regime and mixed geology. They are generally well drained, loamy and very deep. Approximately 75 percent of MLRA 24 is federally owned, the remainder is primarily used for farming, ranching and mining. Irrigated land makes up about 3 percent of the area; the majority of irrigation water is from surface water sources, such as the Humboldt River and Rye Patch Reservoir. Annual precipitation ranges from 6 to 12 inches (15 to 30 cm) for most of the area, but can be as much as 40 inches (101 cm) in the mountain ranges. The majority of annual precipitation occurs as snow in the winter. Rainfall occurs as high-intensity, convective thunderstorms in the spring and fall. 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 ascends the western slopes of the Sierra Range, the air cools, condensation takes place 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.

Ecological site concept

The soils associated with this site have formed in coarse textured alluvium or aeolian deposits from mixed rock sources. Some soils have a thick layer of overblown or alluvial sand. These soils have rapid infiltration and percolation rates, very low available water capacity and are somewhat excessively drained with very low runoff. Potential for sheet and rill erosion is slight, but wind erosion potential is high. Spiny hopsage (GRSP) and Indian ricegrass (ACHY) are dominant species.

Associated sites

R024XY017NV	**SANDY 8-10 P.Z.** This site is on sand sheets and sand dunes. Soils associated with this site are very deep, well drained to somewhat excessively drained, and formed in alluvium or eolian deposits derived from mixed parent material. The soil profile is characterized by an ochric epipedon. Surface textures are usually loamy fine sand or loamy very fine sand.

R024XY009NV	**SALINE MEADOW** This site is on floodplains and inset fans. Soils are very deep, poorly drained and formed in alluvium derived from mixed parent material. The soil profile is characterized by a fine sand surface texture. Important abiotic factors contributing to this ecological site include high sodicity, moderately high salinity and a water near the surface at during some part of the year.

Similar sites

R024XY001NV	**DUNES 6-10 P.Z.** Occurs on sandhill or dune landform; Indian ricegrass (ACHY) dominant grass; needle and thread (HECO26) not codominant.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Grayia spinosa*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site is on sand sheets that cover lower erosional fan remnants and alluvial fans. Slopes range from 0 to 15 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 3800 to 5000 feet (1158 to 1524 m).

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Fan remnant (3) Alluvial fan
Runoff class	Very low
Flooding frequency	None
Ponding frequency	None
Elevation	1,160 – 1,520 m
Slope	0 – 20 %
Water table depth	180 cm

Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 5 to 8 inches (13 to 20cm). Mean annual temperatures are 45 to 53 degrees F. The average growing season is about 90 to 130 days.

Table 3 Representative climatic features

Frost-free period (average)	130 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

The soils associated with this site have formed in coarse textured alluvium or aeolian deposits from mixed rock sources. Some soils have a thick layer of overblown or alluvial sand. These soils have rapid infiltration and percolation rates, very low available water capacity and are somewhat excessively drained with very low runoff. Potential for sheet and rill erosion is slight, but wind erosion potential is high. The soil series associated with this site includes: Hawsley.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Eolian deposits
Surface texture	(1) Fine sand (2) Loamy sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	180 – 210 cm
Surface fragment cover <=3"	0 – 10 %

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	6.86 – 7.11 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 10
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

This plant community is dynamic in response to changing weather patterns and disturbance regimes. The potential native plant community is dominated by Indian ricegrass, spiny hopsage and fourwing saltbush. Shadscale, Nevada dalea, bud sagebrush and winterfat are associated shrub species. Needleandthread, squirreltail and basin wildrye are common species found throughout.

In arid and semi-arid systems coarse-textured soils lose less moisture to evaporation than fine-textured soils and thus have higher water availability (Lane et al 1998). This principle known as the inverse-texture hypothesis, predicts that plant communities on coarse-textured soils should have higher above-ground net primary productivity than communities on fine-textured soils in arid or semi-arid regions. Sandy soils are highly susceptible to wind erosion. Management of the plant community should insure sufficient plant cover to protect site from soil surface movement. Infiltration is rapid on coarse-textured soil reducing the potential for sheet and rill erosion during typical precipitation events.
Spiny hopsage is well adapted to sagebrush deserts and is highly drought tolerant. It can be evergreen in southern deserts, but is deciduous in the summer in northern deserts. Spiny hopsage accumulates large amounts of potassium in its leaves. The decay of the leaf litter under the canopy is capable of concentrating potassium on the soil surface and raising the surface soil pH. These soil changes may affect future growth of spiny hopsage and associated shrubs. Spiny hopsage, a member of the Chenopodiaceae is fairly tolerant of alkaline and saline soils and it commonly found on highly calcareous alkaline soils. It is capable of growing on a wide range of soil textures, but prefers sandy soils (Tirmenstein 1999).

This ecological site is dominated by perennial bunchgrasses. Grasses have an extensive fibrous root system that aids in soil stabilization and contributes organic matter to the soil profile. Grasses are intensive exploiters; they extract a large portion of their moisture from shallow soil horizons through their dense network of shallow roots (Burgess 1995). This trait makes grasses very efficient competitors for

limited shallow soil moisture, especially during summer precipitation events. The shrubs of this site are extensive exploiters; they have roots systems that penetrate large volumes of soil both shallow and deep layers (Burgess 1995). This allows shrubs to extract moisture from layers that are too deep or distributed too erratically for intensive exploiters.

Vegetation plays an important role in reducing the erodibilty of the soil surface. Incorrect management actions may result in reduced vegetative cover and increased soil erosion. Long-term surface disturbance or reoccurring wildfire will reduce native plant cover, plant density, and species diversity of this site. As ecological condition declines, Indian ricegrass and needleandthread decrease in the understory. Spiny hopsage, fourwing saltbrush, shadscale, and rabbitbrush increase and become the dominant vegetation as conditions decline. Cheatgrass, Russian thistle, halogeton, and annual mustards are species likely to invade this site.
Fire Ecology:
The mean fire return interval for salt-desert shrub communities ranges from 35 to 100 years. Increased presence of non-native annual grasses, such as cheatgrass, can alter fire regimes by increasing fire frequency under wet to near-normal summer moisture conditions. When fire does occur, the effect on the ecosystem may be extreme. 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. Needleandthread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread is slightly too severely damaged by fire. Needleandthread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire.
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. Fire typically top-kills or kills fourwing saltbush. Fourwing saltbush may sprout after top-kill, depending upon ecotype. Fourwing saltbush probably establishes primarily from seed after fire, with some populations also regenerating vegetatively. Shadscale is fire intolerant and it does not readily recover from fire, except for establishment through seed. Nevada dalea communities rarely burn, thus Nevada dalea has little adaptations to fire and is probably killed. Nevada ephedra is a minor component of the reference plant community. Ephedra is tolerant of fire and sprouts from the root crown and may increase following fire.

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**			121-202	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	90-135	–
	needle and thread	HECO26	*Hesperostipa comata*	22-45	–
	squirreltail	ELEL5	*Elymus elymoides*	9-22	–
2	**Secondary Perennial Grasses**			9-22	
	basin wildrye	LECI4	*Leymus cinereus*	2-9	–
	Sandberg bluegrass	POSE	*Poa secunda*	2-9	–
Forb					
3	**Perennial Forbs**			9-36	
	buckwheat	ERIOG	*Eriogonum*	2-9	–
	evening primrose	OENOT	*Oenothera*	2-9	–
	globemallow	SPHAE	*Sphaeralcea*	2-9	–
	princesplume	STANL	*Stanleya*	2-9	–
4	**Annual Forbs**			1-22	
Shrub/Vine					
5	**Primary Shrubs**			99-202	
	spiny hopsage	GRSP	*Grayia spinosa*	45-90	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	22-45	–

	shadscale saltbush	ATCO	*Atriplex confertifolia*	22-45	–
	Nevada dalea	PSPO	*Psorothamnus polydenius*	9-22	–
6	**Secondary Shrubs**			9-45	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	4-9	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	4-9	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	4-9	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Livestock Interpretations: This site has value for livestock grazing. Grazing management should be keyed to dominant grasses and palatable shrubs 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. Heavy spring grazing has been found to sharply reduce the vigor of Indian ricegrass and decrease the stand (Cook and Child 1971). In eastern Idaho, productivity of Indian ricegrass was at least 10 times greater in undisturbed plots than in heavily grazed ones (Pearson 1976). Cook and Child (1971) found significant reduction in plant cover after 7 years of rest from heavy (90%) and moderate (60%) spring use. The seed crop may be reduced where grazing is heavy (Bich et al. 1995). Tolerance to grazing increases after May thus spring deferment may be necessary for stand enhancement (Pearson 1964; Cook and Child 1971), however utilization of less than 60% is recommended. 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. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock. 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. 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. Shadscale is a valuable browse species, providing a source of palatable, nutritious forage for a wide variety of livestock. Shadscale provides good browse for domestic sheep. Shadscale leaves and seeds are an important component of domestic sheep and cattle winter diets. 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: 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. Bottlebrush squirreltail is a dietary component of several wildlife species. Bottlebrush squirreltail may provide forage for mule deer and pronghorn. Spiny hopsage provides a palatable and nutritious food source for big game animals. Spiny hopsage is used as forage to at least some extent by domestic goats, deer, pronghorn, and rabbits. 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. Shadscale is a valuable browse species, providing a source of palatable, nutritious forage for a wide variety of wildlife particularly during spring and summer before the hardening of spiny twigs. It supplies browse, seed, and cover for birds, small mammals, rabbits, deer, and pronghorn antelope. Nevada dalea has low palatability to many wildlife species.

Hydrological functions

Runoff is very low. Permeability is rapid. Hydrologic soil group is A. Rills are none. Water flow patterns none. Pedestals are common with occurrence due to wind scouring. Gullies are none. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact.

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

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. 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. Seeds of shadscale were used by Native Americans for bread and mush.

Other information

Needleandthread is useful for stabilizing eroded or degraded sites. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation. 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. 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.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T36N R34E S32
UTM zone	N

UTM northing	4534143
UTM easting	400209
Latitude	40° 57′ 8″
Longitude	118° 11′ 8″
General legal description	SE¼ Approximately 1100 feet north of Junbgo Road and 500 feet west of Johnson Well, Humboldt County, Nevada.

Other references

Bich, B.S., J.L. Butler, and C.A. Schmidt. 1995. Effects of differential livestock use of key plant species and rodent populations within selected Oryzopsis hymenoides/Hilaria jamesii communities in Glen Canyon National Recreation Area. The Southwestern Naturalist 40(3):281-287.
Burgess, T.L. 1995. Desert Grassland, Mixed Shrub Savanna, Shrub Steppe, or Semidesert Scrub? Pp. 31-67 in M.P. McClaran and T.R. Van Devender (eds.), the Desert Grassland. University of Arizona Press, Tucson Arizona
Cook, C.W. and R.D. Child. 1971. Recovery of desert plants in various states of vigor. Journal of Range Management 24(5):339-343.
Lane, D.R., D.P. Coffin and W.K. Lauenroth. 1998. Effects of soil texture and precipitation on above ground net primary productivity and vegetation structure across the central grassland region of the United States. Journal of Vegetation Science. 9:239-250.
Pearson, L.C. 1964. Effect of harvest date on recovery of range grasses and shrubs. Agronomy Journal 56:80-82.
Pearson, L.C. 1976. Primary production in grazed and ungrazed desert communities of eastern Idaho. Ecology 46(3):278-285.
Tirmenstein, D. A. 1999. Grayia spinosa. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/

Contributors

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Approval

Kendra Moseley, 3/06/2025

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	03/19/2010

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

Indicators

1. **Number and extent of rills:** **Rills are none.**

2. **Presence of water flow patterns:** **Water flow patterns none.**

3. **Number and height of erosional pedestals or terracettes:** **Pedestalling may occur in wind scoured areas.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare Ground ± 60-70%.**

5. **Number of gullies and erosion associated with gullies:** **Gullies are none.**

6. **Extent of wind scoured, blowouts and/or depositional areas:** **Slight to moderate wind scouring.**

7. **Amount of litter movement (describe size and distance expected to travel):** **Fine litter (foliage from grasses and annual & perennial forbs) expected to move unsheltered distance during heavy wind. Persistent litter (large woody material) will remain in place except during intense summer convection storms.**

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 3 on the sandy soil textures found on this site. (To be field tested.)**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** **Surface structure is single grained. 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.**

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.

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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.**

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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 > tall shrubs (spiny hopsage)

    Sub-dominant: Associated shrubs > shallow-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, annual and perennial 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 (<25%) have dead centers.**

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14. **Average percent litter cover (%) and depth (in):** **Between plant interspaces (± 10-15%) and depth (± ¼in.)**

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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 (February thru May) ± 400 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:** **Increasers include Douglas rabbitbrush and horsebrush. Invaders include cheatgrass, snakeweed, halogeton, Russian thistle, annual mustards, and knapweeds.**

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