

Ecological site R024XY066NV

SODIC DUNES

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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

This site is found on partially stabilized sand dunes that typically occurs adjacent to and on the leeward side of large playas. The soils associated with this site are sandy throughout, somewhat excessively drained, fine sandy surface and an ochric epipedon.

Associated sites

| | |
|--------------------|--------------------------------|
| R023XY038NV | DROUGHTY LOAM 8-10 P.Z. |
| R024XY022NV | SODIC TERRACE 8-10 P.Z. |

Similar sites

| | |
|--------------------|---|
| R024XY001NV | DUNES 6-10 P.Z. Basin big sagebrush dominant. |
|--------------------|---|

Table 1. Dominant plant species

| | |
|------------|------------------------------------|
| Tree | Not specified |
| Shrub | (1) <i>Sarcobatus vermiculatus</i> |
| Herbaceous | (1) <i>Achnatherum hymenoides</i> |

Physiographic features

This site occurs on partially stabilized sand dunes that typically occur adjacent to, and on the leeward side, of large playas. Slopes range from 2 to 15 percent, but slope gradients of 4 to 15 percent slopes are most typical. Elevations are 4200 to 5900 feet.

Table 2. Representative physiographic features

| | |
|-------------------|------------------------------------|
| Landforms | (1) Dune |
| Runoff class | Negligible to very low |
| Elevation | 1,280 – 1,800 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 6 to 10 inches. Mean annual air temperature is 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) | 250 mm |

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils associated with this site exhibit minimal characteristics associated with soil development and are somewhat excessively drained. The soils are windblown fine sands typically more than 40 inches in depth. The soil profile is sandy throughout and has an ochric epipedon.

Underground water occurs within the rooting depth of black greasewood. Because of rapid to very rapid intake and deep percolation of water, surface runoff is very low. The extremely loose and unstable surface soils and low fertility of these soils are not favorable to uniform stands of perennial herbaceous plants. These soils are extremely susceptible to wind erosion.

Soil component correlated to site: Goldrun.

Table 4. Representative soil features

| | |
|---|---|
| Parent material | (1) Eolian deposits |
| Surface texture | (1) Fine sand |
| Family particle size | (1) Sandy |
| Drainage class | Somewhat excessively drained to excessively drained |
| Permeability class | Rapid to very rapid |
| Soil depth | 180 – 210 cm |
| Surface fragment cover <=3" | Not specified |
| Surface fragment cover >3" | Not specified |
| Available water capacity (0-101.6cm) | 7.62 – 7.87 cm |
| Calcium carbonate equivalent (0-101.6cm) | Not specified |
| 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 – 8.4 |

| | |
|--|---------------|
| Subsurface fragment volume <=3" (Depth not specified) | Not specified |
| Subsurface fragment volume >3" (Depth not specified) | Not specified |

Ecological dynamics

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.

The soils of this ecological site are windblown fine sands typically more than 40 inches in depth. The soil profile is somewhat excessively to excessively drained and available water capacity is low. Underground water occurs within the rooting depth of black greasewood. Because of rapid to very rapid intake and deep percolation of water, surface runoff is very low. The extremely loose and unstable surface soils and low fertility of these soils are not favorable to uniform stands of perennial herbaceous plants. These soils are extremely susceptible to wind erosion. 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.

Black greasewood occurs in nearly pure stands on saline sites. On less saline site it can be found growing with a variety of shrub species including, spiny hopsage, fourwing saltbrush, Nevada Ephedra, horsebrush and rabbitbrush. Black greasewood reproduces by seed and by sprouting from its root crown and spreading lateral root system. It is clonal and may have many major stems arising from one large clump. Black greasewood is phreatophytic, its distribution is correlated to the distribution of ground water. The maximum rooting depth is determined by depth to a saturated zone, where ground water is present, and also drought tolerant. Black greasewood is typically deep rooted with few shallow roots near the surface (Anderson 2004). On sites dominated by black greasewood, surface soil may contain elevated levels of sodium and other cations, especially directly under shrubs where localized recycling occurs. Salt accumulates on black greasewood leaves and leaches in to the soil from fallen leaves.

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 is 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 co-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 root 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 erodibility 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. Black greasewood, spiny hopsage, horsebrush and rabbitbrush increase and become the dominant vegetation as conditions decline. When this site burns grazing needs to be curtailed until perennial grass species are well established. Cheatgrass, halogeton and Russian thistle are species likely to invade this site.

Fire Ecology:

Black greasewood communities have been historically subject to stand-replacing fire regimes with intervals of

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 | | | 130-238 | |
| | Indian ricegrass | ACHY | <i>Achnatherum hymenoides</i> | 112-157 | – |
| | needle and thread | HECO26 | <i>Hesperostipa comata</i> | 9-45 | – |
| | basin wildrye | LECI4 | <i>Leymus cinereus</i> | 9-36 | – |
| 2 | Secondary Perennial Grasses | | | 9-45 | |
| | saltgrass | DISP | <i>Distichlis spicata</i> | 2-9 | – |
| | squirreltail | ELEL5 | <i>Elymus elymoides</i> | 2-9 | – |
| | thickspike wheatgrass | ELLAL | <i>Elymus lanceolatus ssp. lanceolatus</i> | 2-9 | – |
| | beardless wildrye | LETR5 | <i>Leymus triticoides</i> | 2-9 | – |
| Forb | | | | | |
| 3 | Perennial Forbs | | | 9-36 | |
| | canaigre dock | RUHY | <i>Rumex hymenosepalus</i> | 2-13 | – |
| | princesplume | STANL | <i>Stanleya</i> | 2-13 | – |
| 4 | Annual Forbs | | | 1-13 | |
| Shrub/Vine | | | | | |
| 5 | Primary Shrubs | | | 179-269 | |
| | greasewood | SAVE4 | <i>Sarcobatus vermiculatus</i> | 157-202 | – |
| | spiny hopsage | GRSP | <i>Grayia spinosa</i> | 22-67 | – |
| 6 | Secondary Shrubs | | | 22-67 | |
| | fourwing saltbush | ATCA2 | <i>Atriplex canescens</i> | 4-13 | – |
| | yellow rabbitbrush | CHVI8 | <i>Chrysothamnus viscidiflorus</i> | 4-13 | – |
| | Nevada jointfir | EPNE | <i>Ephedra nevadensis</i> | 4-13 | – |
| | rubber rabbitbrush | ERNAN5 | <i>Ericameria nauseosa ssp. nauseosa var. nauseosa</i> | 4-13 | – |
| | horsebrush | TETRA3 | <i>Tetradymia</i> | 4-13 | – |

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. Black greasewood is an important winter browse plant for domestic sheep and cattle. It also receives light to moderate use by domestic sheep and cattle during spring and summer months. Black greasewood contains soluble sodium and potassium oxalates that may cause poisoning and death in domestic sheep and cattle if large amounts are consumed in a short time. 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. 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. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. 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: Black greasewood is an important winter browse plant for big game animals and a food source for many other wildlife species. It also receives light to moderate use by mule deer and pronghorn during spring and summer months. 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. 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. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses.

Hydrological functions

Runoff is very slow. Permeability is rapid to very rapid. Hydrologic soil group is A. Rills are none. Water flow patterns none. Pedestals are few to 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 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 hiking and has potential for upland and big game hunting.

Other products

The leaves, seeds and stems of black greasewood are edible. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Black greasewood is useful for stabilizing soil on wind-blown areas. It successfully revegetates eroded areas and sites too saline for most plant species. 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. Needleandthread is useful for stabilizing eroded or degraded sites. Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment.

Inventory data references

NASIS soil component data.

Type locality

| | |
|-------------------------------|--|
| Location 1: Washoe County, NV | |
| Township/Range/Section | T37N R19E S17 |
| UTM zone | N |
| UTM northing | 4552552 |
| UTM easting | 258532 |
| Latitude | 41° 5' 18" |
| Longitude | 119° 52' 29" |
| General legal description | Northeast portion of Duck Flat, Washoe County, Nevada. This site also occurs in Humboldt County, Nevada. |

Other references

- Anderson, Michelle D. 2004. *Sarcobatus vermiculatus*. 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/>
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- 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

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:** Pedestals are few to common with occurrence due to wind scouring.

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

5. **Number of gullies and erosion associated with gullies:** 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) expected to remain in place.

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. (To be field tested.)

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 are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically less than 1 percent. 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 and provide opportunity for snow catch and accumulation on site.

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 not typical. Massive sub-surface horizons are not to be interpreted as compacted layers.

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: Tall shrubs (black greasewood) > deep-rooted, cool season, perennial bunchgrasses

Sub-dominant: Associated shrubs > shallow-rooted or rhizomatous, cool season perennial grasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, annual and perennial forbs

Other:

Additional:

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 40% of total woody canopy; some of the mature bunchgrasses ($\pm 25\%$) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces ($\pm 10-15\%$) 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 (February thru May) \pm 400 lbs/ac; Spring moisture significantly affects total production.
-

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: Increasesers include rabbitbrush, horsebrush, and black greasewood. Invaders include cheatgrass, halogeton, Russian thistle, annual mustards, annual kochia, and bassia.**
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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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