Ecological site R024XY001NV
DUNES 6-10 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): 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.). MLRA 24 is found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Elevations predominantly range from 3,950 to 5,900 feet (1,205 to 1,800 meters). The elevations of 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. Playas, however, 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. Young andesite and basalt flows (6 to 17 million years old) are 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. 75 percent of MLRA 24 is federally owned. The remainder is primarily used for farming, ranching and mining. Irrigated land comprises 3 percent of the area; most of the irrigation water is from surface water sources, such as the Humboldt River and Rye Patch Reservoir. Annual precipitation typically ranges from 6 to 12 inches (15 to 30 cm) for most of the area. In the mountains however the precipitation may be up to 40 inches (101 cm). Most of the annual precipitation is from snow in the winter. In the spring and fall, rainfall occurs as high- intensity, convective thunderstorms. Nevada is 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. The warm moist air from the Pacific Ocean ascends the western slopes of the Sierra Range, the air cools, condenses and 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. The result is the lowlands of Nevada are largely desert or steppes.

Ecological site concept

The central concept for Dunes 6 to 10 ecological site is on thick sand sheets on middle and lower piedmont slopes, and sand sheets. Soils associated with this site are very deep, somewhat excessively drained and formed in eolian and lacustrine sands derived from mixed rocks, with influence from volcanic ash. Soils are characterized by an ochric epipedon, minimal soil development, and coarse textured throughout the profile, the soils have a low to very low available water capacity (AWC) and are somewhat excessively drained. Important abiotic factors include Basin big sagebrush (ARTR4) and Indian ricegrass (ACHY).

Associated sites

R024XY002NV	**LOAMY 5-8 P.Z.** This site includes limited effective moisture, salt-affected soils, and low precipitation.
R024XY020NV	**DROUGHTY LOAM 8-10 P.Z.** Soils are very deep, well drained and formed in a thin layer of loess and alluvium. The plant community is characterized by the mixing of shadscale (ATCO), and black greasewood (SAVE4).

R024XY022NV	**SODIC TERRACE 8-10 P.Z.** Soils are characterized by a very low infiltration, an ochric epipedon and moderate to very strong alkalinity. The plant community is characterized by the mixing of shadscale (ATCO) and black greasewood (SAVE4) and approximate canopy cover is less than 15 percent.
R024XY055NV	**SANDY 5-8 P.Z.** 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. Spiny hopsage (GRSP) and Indian ricegrass (ACHY)
R024XY003NV	**SODIC TERRACE 6-8 P.Z.** Soils are very deep, well drained and formed in a thin layer of loess and alluvium. Soils are characterized by a very low infiltration. Dominant plants are shadscale (ATCO) and black greasewood (SAVE4)

Similar sites

R024XY066NV	**SODIC DUNES** This site is found on partially stabilized sand dunes that typically occurs adjacent to and on the leeward side of large playas. Black greasewood (SAVE4) dominant shrub; Big sagebrush (ARTR2) rare, if present.
R024XY058NV	**SANDY LOAM 8-10 P.Z.** Indian ricegrass (ACHY)-needle and thread (HECO26) codominant; not on dune landform
R024XY017NV	**SANDY 8-10 P.Z.** Indian ricegrass (ACHY)-needle and thread (HECO26) codominant grasses; more productive site; not on dune landform

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. tridentata*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

Dunes 6 to 10 is on thick sand sheets on middle and lower piedmont slopes and sand dunes covering pluvial beach terraces. The dunes may be undulating to rolling and partially stabilized. Slopes range from 0 to 30 percent, with some micro-slopes to 60 percent. Elevations are 3,600 to 5,700 feet (1,097 to 1,737 meters).

Table 2. Representative physiographic features

Landforms	(1) Sand sheet (2) Dune
Runoff class	Negligible to very low
Flooding frequency	None
Elevation	1,100 – 1,740 m
Slope	0 – 30 %
Water table depth	180 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with Dunes 6 to 10 ecological site is considered semiarid. The climate is characterized by cool, moist winters and hot, dry summers. Precipitation occurs from November through May, 70 percent of the time, typically. Average annual precipitation ranges from 6 to 10 inches (15 to 25 cm).
Mean annual air temperature is 45 to 50 degrees F. The average growing season is about 100 to 120 days.

Mean precipitation by month (in inches):

Jan 1.01 (2.57 cm); Feb 0.89 (2.26 cm); Mar 0.92 (2.34 cm);
Apr 1.04 (2.64 cm); May 1.09 (2.77 cm); Jun 0.86 (2.2 cm);
Jul 0.25 (.64 cm); Aug 0.27 (.69 cm); Sept 0.43 (1.09 cm);
Oct 0.78 (1.98 cm); Nov 0.88 (2.24 cm); Dec 0.97 (2.46 cm).

The above data is averaged from Winnemucca Airport and the Orovada WRCC.

Table 3 Representative climatic features

Frost-free period (characteristic range)	80-80 days
Freeze-free period (characteristic range)	100-110 days
Precipitation total (characteristic range)	230-250 mm
Frost-free period (actual range)	80-80 days
Freeze-free period (actual range)	100-110 days
Precipitation total (actual range)	200-250 mm

Frost-free period (average)	80 days
Freeze-free period (average)	110 days
Precipitation total (average)	230 mm

- (1) WINNEMUCCA MUNI AP [USW00024128], Winnemucca, NV
- (2) OROVADA 3 W [USC00265818], Orovada, NV

Influencing water features

Influencing water features are not associated with this site.

Soil features

Soils associated with this site are very deep, and exhibit minimal characteristics associated with soil development. Soils are formed in eolian and lacustrine sands derived from mixed rocks with some influence from volcanic ash. Coarse textured throughout the profile, the soils have a low to very low available water capacity, and are somewhat excessively drained. Soils are very porous and generally not affected by excess salts or sodium except at lower depths in the C horizon in some profiles. Some areas have a water table within the rooting zone of black greasewood. Almost all the precipitation that falls upon this site is available for plant use. Deep-rooted plants are particularly suited to this site as they can take advantage of rapid infiltration and deep percolation of water through the sandy soils. Runoff is negligible to very low. The potential for wind erosion is high. The soils have an ochric epipedon. The soil moisture regime is mesic and the soil temperature regime is aridic bordering on xeric. Soils associated with this site include Goldrun, a mixed, mesic, Xeric Torripsamment.

Table 4. Representative soil features

Parent material	(1) Lacustrine deposits (2) Eolian sands (3) Volcanic ash
Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Rapid
Soil depth	180 – 210 cm
Surface fragment cover <=3"	Not specified

Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	7.87 – 9.4 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	8.2 – 10
Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

The plant communities of this site are dynamic in response to changing weather patterns and disturbance regimes. The reference plant community is dominated by Indian ricegrass and basin big sagebrush. Spiny hopsage, winterfat, fourwing saltbush and ephedra are associated shrub species. Needle-and-thread, thickspike wheatgrass, and basin wildrye are other common species.

This ecological site is characterized by coarse textured soils formed from eolian deposits. Soils associated with this ecological site are very deep and exhibit minimal characteristics associated with soil development. 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.

Sand dunes form a unique system that can be mobile or fixed by vegetation. Over the course of geologic time, mobility of sand dunes is related to increasing aridity, and vegetation stabilizes during wet phases (Tsoar 2005). Sandy soils are highly susceptible to wind erosion. Management of the plant community should ensure 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.

Deep-rooted plants are well suited to this site because deep roots can take advantage of rapid infiltration and deep percolation of water. Big sagebrush root systems are well developed, with both lateral roots and tap roots. Tap roots penetrate as deep as six feet (1.8 Meters) (Howard 1999). Research suggests that the taproots of sagebrush plants absorb moisture from the deeper soil horizons and transport it to the lateral roots in the drier upper soil horizons (Richards and Caldwell 1987). Hydraulic lift by deep-rooted species can result in greater competitive ability for limited resources than root distribution would suggest.

Big sagebrush species regenerates solely from seed and do not sprout or layer. Big sagebrush generally flowers and sets seed in late summer and fall. Most seed shatters within a week of maturation and travels less than 100 feet (30.5 meters) from the parent plant. Germination occurs the following spring, cold stratification and light improves germination (Howard 1999). Sagebrush seedlings require sufficient soil moisture to germinate and survive. Mature shrubs, perennial bunchgrasses and litter can create microhabitats with very good germination conditions.

As ecological conditions decline and where management results in abusive grazing by livestock or feral horses, needle and thread and Indian ricegrass decrease. Sandberg's bluegrass and bottlebrush squirreltail increase and become the dominant understory vegetation. Further site deterioration, cheatgrass and annual mustards replace perennial grasses and dominate the understory. The dominant overstory vegetation becomes big sagebrush, rabbitbrush, and horsebrush. Cheatgrass, halogeton, annual mustards, and Russian thistle are species likely to invade this site. Reduction in plant cover or changes in plant community composition and structure increases the risk of active soil movement and dune creation or flattening.

Fire Ecology:
Sagebrush steppe communities have historically been subject to fires at varying intervals (25 to 70+ years). Fire severity in big sagebrush communities is described as variable depending on weather, fuels, and topography. Fire is the principal means of renewal for decadent stands of big sagebrush. Basin big sagebrush and Wyoming big sagebrush are readily killed when aboveground plant parts are charred by fire. Prolific seed production from nearby unburned plants coupled with high germination and survival rates is required to ensure establishment following fire.

In many big sagebrush communities, fire frequency, intensity and fire suppression have changed. Livestock grazing, and off-road vehicle use have also changed. Invasion of cheatgrass, mustards, and other annual non-natives decreases site resilience, increases the risk of stand-replacing fires, and decreases the potential for sagebrush and perennial grass establishment. Continual sand movement and subsequent burying of seed may prohibit seedling establishment.

Spiny hopsage is somewhat fire tolerant and commonly 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. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas.

Needle-and-thread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle-and-thread grass is classified as slightly to severely damaged by fire. Needle-and-thread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery typically takes 2 to 10 years.

Thickspike wheatgrass is quite tolerant of fire. Subsurface growing points and primarily rhizomatous reproduction may explain its ability to increase rapidly (within 2-5 years) following burning.

Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

State and transition model

Figure 7. State and Transition Model

Figure 8. STM Narrative

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**			235-437	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	168-224	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	28-84	–
	needle and thread	HECO26	*Hesperostipa comata*	28-84	–
	basin wildrye	LECI4	*Leymus cinereus*	11-45	–
2	**Secondary Perennial Grasses**			11-45	
	saltgrass	DISP	*Distichlis spicata*	3-11	–
	squirreltail	ELEL5	*Elymus elymoides*	3-11	–

Forb					
3	**Perennial Forbs**			28-84	
	sand verbena	ABRON	*Abronia*	3-17	–
	common starlily	LEMO4	*Leucocrinum montanum*	3-17	–
	canaigre dock	RUHY	*Rumex hymenosepalus*	3-17	–
	princesplume	STANL	*Stanleya*	3-17	–
4	**Annual Forbs**			1-17	
Shrub/Vine					
5	**Primary Shrubs**			151-241	
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	140-196	–
	spiny hopsage	GRSP	*Grayia spinosa*	11-45	–
6	**Secondary Shrubs**			28-56	
	fourwing saltbush	ATCA2	*Atriplex canescens*	3-11	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	3-11	–
	jointfir	EPHED	*Ephedra*	3-11	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	3-11	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	3-11	–
	Nevada dalea	PSPO	*Psorothamnus polydenius*	3-11	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	3-11	–
	hairy horsebrush	TECO2	*Tetradymia comosa*	3-11	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	3-11	–

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 shrub production. Basin big sagebrush may serve as emergency food during severe winter weather, but it is not typically sought out by 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. 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 sharply reduces 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) describe significant reduction in plant cover after 7 years of rest from heavy (90 percent) and moderate (60 percent) 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 percent is recommended. Needle-and-thread 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. Thickspike wheatgrass is palatable to all classes of livestock and wildlife. It is a preferred feed for cattle, sheep, horses, and elk in spring and is considered a desirable feed for deer and antelope in spring. It is considered a desirable feed for cattle, sheep, and horses in summer, fall, and winter. Thickspike wheatgrass's extensive rhizome system allows established stands to withstand heavy grazing and trampling. 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 commonly 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: Basin big sagebrush is the least palatable of all the subspecies of big sagebrush. Basin big sagebrush is browsed by mule deer from fall to early spring but is not preferred. 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. Several 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. Needle-and-thread is moderately important spring forage for mule deer but use declines considerably as more preferred forages become available. In the spring, it is a preferred feed for elk and is considered desirable feed for deer and antelope. It is desirable feed for elk during summer, fall, and winter. Thickspike wheatgrass is also a component of black-tailed jackrabbit diets. Thickspike wheatgrass provides some cover for small mammals and birds. Basin wildrye provides winter forage for mule deer, though use is commonly 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. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities.

Hydrological functions

Runoff is very low to low. Permeability is rapid. Hydrologic soil groups are A. Rills are none. Water flow patterns none. Pedestals are common 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 has potential for upland bird and big game hunting.

Other products

Native Americans use the bark of big sagebrush to make rope and baskets. Native Americans traditionally grind parched seeds of spiny hopsage to make pinole flour. Indian ricegrass is traditionally eaten by Native Americans. The Paiutes use seed as a reserve food source. Basin wildrye is used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

Other information

Basin big sagebrush has high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed. Spiny hopsage has moderate potential for erosion control and low to high potential for long-term revegetation projects. Spiny hopsage can improve forage, control wind erosion, and increase soil stability on gentle to moderate slopes. Needle-and-thread grass is useful for stabilizing eroded or degraded sites. Thickspike is a good revegetation species because it forms tight sod under dry rangeland

conditions, has good seedling strength, and performs well in low fertility or eroded sites. It does not compete well with aggressive introduced grasses during the establishment period, but are very compatible with slower developing natives, bluebunch wheatgrass (Pseudoroegneria spicata), western wheatgrass (Pascopyrum smithii), and needlegrass (Achnatherum spp.) species. Thickspike's drought tolerance combined with rhizomes, fibrous root systems, and good seedling vigor make these species ideal for reclamation in areas receiving 8 to 20 inches (20 to 51 cm) annual precipitation. Thickspike wheatgrass can be used for hay production and will make nutritious feed, but is more suited to pasture use. 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 mapunit data correlated to ecological site.

Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T35N R37E S17
UTM zone	N
UTM northing	429126
UTM easting	4528994
Latitude	40° 54′32″
Longitude	117° 50′29″
General legal description	NW¼ NW¼ About 6 miles west of Winnemuca, at I80 mile marker 171 (eastbound right-of-way) Humboldt County, Nevada. This site also occurs in Elko, Eureka, Lander, Pershing, and Washoe Counties, Nevada.

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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	12/02/2009
Approved by	
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:** None

3. **Number and height of erosional pedestals or terracettes:** Pedestals are few with occurrence due to wind scouring. After wildfires, the remaining vegetation may become severely pedestalled

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 50 to 60 percent.

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. Severe blowouts and flattening of dunes may occur after severe wildfires and the resulting loss of vegetation

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.)

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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

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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

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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: Deep-rooted, cool season, perennial bunchgrasses > tall shrubs (basin big sagebrush)

    Sub-dominant: associated shrubs > cool season, perennial, rhizomatous grass > 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 percent of total woody canopy; some of the mature bunchgrasses (less than 25 percent) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Under shrubs and between plant interspaces (15-20%) 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) ± 500 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:** Potential invaders include

cheatgrass, halogeton, Russian thistle, and annual mustards.

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