

# Ecological site R024XY058NV

## SANDY LOAM 8-10 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) 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.

### Ecological site concept

This site is found on fan remnants. Soils are moderately deep to a duripan, well drained and formed in alluvium derived from mixed alluvium. The soil profile was characterized by an ochric epipedon and a cambic horizon. Important abiotic factors contributing to the presence of this site include the fine loam, fine sandy loam or loamy fine sand surface textures allowing for the dominance of Idaho fescue (FEID) and needle and thread (HECO26). Components will be field checked and full consideration will be given to combining 024XY017NV, 024XY018OR and 024XY058NV.

### Associated sites

<b>R024XY002NV</b>	<p><b>LOAMY 5-8 P.Z.</b></p> <p>This site includes limited effective moisture, salt-affected soils, and low precipitation</p>
<b>R024XY001NV</b>	<p><b>DUNES 6-10 P.Z.</b></p> <p>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.</p>

<b>R024XY005NV</b>	<p><b>LOAMY 8-10 P.Z.</b></p> <p>Important abiotic factors contributing to the presence of this ecological site include limited precipitation and the presence of the argillic horizon that helps retain soil moisture. The fine-textured/clay rich horizons, lying beneath the coarser-textured horizons become impermeable as the swelling matrix closes following wetting.</p>
<b>R024XY017NV</b>	<p><b>SANDY 8-10 P.Z.</b></p> <p>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 greater than 50 percent sand in the particle size control section and less than 20 percent clay.</p>
<b>R024XY020NV</b>	<p><b>DROUGHTY LOAM 8-10 P.Z.</b></p> <p>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) and approximate canopy cover is less than 15 percent. Approximate vegetative composition is 85 percent shrubs, 10 percent grasses, and 5 percent forbs.</p>
<b>R024XY035NV</b>	<p><b>SHALLOW LOAM 10-14 P.Z.</b></p> <p>This site is on mountains. Soils are shallow to bedrock, well drained and formed in residuum. The soil profile is characterized by an ochric epipedon and an argillic horizon. Important abiotic factors contributing to the presence of this ecological site include the shallow depth that limits productivity and prevents the development of a mollic.</p>

**Similar sites**

<b>R024XY017NV</b>	<p><b>SANDY 8-10 P.Z.</b></p> <p>Less productive site. Dominance by needle and thread grass (HECO26) and Indian ricegrass (ACHY).</p>
<b>R024XY001NV</b>	<p><b>DUNES 6-10 P.Z.</b></p> <p>Occurs on sandhill or dune landform; Indian ricegrass (ACHY) dominant grass; needle and thread (HECO26) not codominant.</p>

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i>
Herbaceous	(1) <i>Hesperostipa comata</i> (2) <i>Achnatherum hymenoides</i>

**Physiographic features**

This site is on smooth to convex hills and mountain side slopes having a northerly aspect. Slopes range from 8 to 50 percent. Elevations are 4,500 to 6,500 feet (1,372 to 1,981m).

**Table 2. Representative physiographic features**

Landforms	(1) Mountain slope (2) Hill
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,370 – 1,980 m
Slope	10 – 50 %
Water table depth	180 cm
Aspect	N

### Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 10 inches (20 to 25cm). Mean annual temperatures are 45 to 53 degrees F. The average growing season is about 100 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

The soils associated with this site are moderately deep to a duripan and well drained. The soil profile is characterized by an ochric epipedon and a cambic horizon. Surface textures are fine loam, loamy fine sand and fine sandy loam. The available water capacity is low. Soil series associated with this site include Bliss and Panlee.

**Table 4. Representative soil features**

Parent material	(1) Alluvium (2) Residuum (3) Colluvium
Surface texture	(1) Very fine sandy loam (2) Cobbly very fine sandy loam (3) Gravelly very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	50 – 150 cm
Surface fragment cover ≤3"	10 – 20 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	10.67 – 11.94 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
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 – 9.6

Subsurface fragment volume ≤3" (Depth not specified)	10 – 30 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

## Ecological dynamics

An ecological site is the product of all the environmental factors responsible for its development and it has a set of key characteristics that influence a site's resilience to disturbance and resistance to invasives. Key characteristics include 1) climate (precipitation, temperature), 2) topography (aspect, slope, elevation, and landform), 3) hydrology (infiltration, runoff), 4) soils (depth, texture, structure, organic matter), 5) plant communities (functional groups, productivity), and 6) natural disturbance regime (fire, herbivory, etc.) (Caudle et al. 2013). Biotic factors that influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al 2013).

This ecological site is dominated by deep-rooted cool season perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. The dominant shrubs usually root to the full depth of the winter-spring soil moisture recharge, which ranges from 1.0 to over 3.0 m. (Comstock and Ehleringer 1992). Root length of mature sagebrush plants was measured to a depth of 2 meters in alluvial soils in Utah (Richards and Caldwell 1987). These shrubs have a flexible generalized root system with development of both deep taproots and laterals near the surface (Comstock and Ehleringer 1992).

In the Great Basin, the majority of annual precipitation is received during the winter and early spring. This continental semiarid climate regime favors growth and development of deep-rooted shrubs and herbaceous cool season plants using the C3 photosynthetic pathway (Comstock and Ehleringer 1992). Winter precipitation and slow melting of snow results in deeper percolation of moisture into the soil profile. Herbaceous plants, more shallow-rooted than shrubs, grow earlier in the growing season and thrive on spring rains, while the deeper rooted shrubs lag in phenological development because they draw from deeply infiltrating moisture from snowmelt the previous winter. Periodic drought regularly influences sagebrush ecosystems and drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity can be altered by the timing of precipitation and water availability within the soil profile (Bates et al 2006).

Variability in plant community composition and production depends on soil surface texture and depth. Thurber's needlegrass will increase on gravelly soils, whereas Indian ricegrass will increase with sandy soil surfaces. A weak argillic horizon will promote production of bluebunch wheatgrass. Production increases with soil depth. The amount of sagebrush in the plant community is dependent upon disturbances such as fire, Aroga moth infestations and grazing. Sandberg bluegrass more easily dominates sites where surface soils are gravelly loams than those where surface soils are silt loams. The higher production sites would be much more resilient than other sites in this group.

Native insect outbreaks are also important drivers of ecosystem dynamics in sagebrush communities. Climate is generally believed to influence the timing of insect outbreaks especially a sagebrush defoliator, Aroga moth (*Aroga websteri*). Aroga moth infestations have occurred in the Great Basin in the 1960s, early 1970s, and have been ongoing in Nevada since 2004 (Bentz, et al 2008). Thousands of acres of big sagebrush have been impacted, with partial to complete die-off observed. Aroga moth can partially or entirely kill individual plants or entire stands of big sagebrush (Furniss and Barr 1975).

The perennial bunchgrasses generally have somewhat shallower root systems than the shrubs, but root densities are often as high as or higher than those of shrubs in the upper 0.5 m but taper off more rapidly than shrubs. General differences in root depth distributions between grasses and shrubs results in resource partitioning in these shrub/grass systems.

The Great Basin sagebrush communities have high spatial and temporal variability in precipitation both among years and within growing seasons. Nutrient availability is typically low but increases with elevation and closely follows moisture availability. The moisture resource supporting the greatest amount of plant growth is usually the water stored in the soil profile during the winter. The invasibility of plant communities is often linked to resource availability. Disturbance can decrease resource uptake due to damage or mortality of the native species and depressed competition or can increase resource pools by the decomposition of dead plant material following disturbance. The invasion of sagebrush communities by cheatgrass has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al 2007).

The introduction of annual weedy species, like cheatgrass, may cause an increase in fire frequency and eventually lead to an annual state. Conversely, as fire frequency decreases, sagebrush will increase and with inappropriate grazing management the perennial bunchgrasses and forbs may be reduced.

This ecological site has low resilience to disturbance and low resistance to invasion. Resilience increases with elevation, aspect, increased precipitation and increased nutrient availability. Five possible alternative stable states have been identified for this DRG.

### Fire Ecology:

Fire is the principal means of renewal of decadent stands of Wyoming big sagebrush. Wyoming big sagebrush communities historically had low fuel loads, and patchy fires that burned in a mosaic pattern were common at 10 to 70 year return intervals (West and Hassan 1985, Bunting et al. 1987). Davies et al. (2007) suggest fire return intervals in Wyoming big sagebrush communities were around 50 to

100 years. More recently, Baker (2011) estimates fire rotation to be 200-350 years in Wyoming big sagebrush communities. Wyoming big sagebrush is killed by fire and only regenerates from seed. Recovery time for Wyoming big sagebrush may require 50 to 120 or more years (Baker 2006). Post-fire hydrologic recovery and resilience is primarily influenced by pre-fire site conditions, fire severity, and post-fire weather and land use that relate to vegetation recovery. Sites with low abundances of native perennial grasses and forbs typically have reduced resiliency following disturbance and are less resistant to invasion or increases in cheatgrass (Miller et al 2013). However, the introduction and expansion of cheatgrass has dramatically altered the fire regime (Balch et al. 2013) and restoration potential of Wyoming big sagebrush communities.

The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses within the site along with seasonality and intensity of the fire all factor into the individual species response. For most forbs and grasses the growing points are located at or below the soil surface providing relative protection from disturbances which decrease above ground biomass, such as grazing or fire. Thus, fire mortality is more related to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Young 1983, Wright 1971).

Burning has been found to decrease the vegetative and reproductive vigor of Thurber's needlegrass (Uresk et al. 1976). Fire can cause high mortality, in addition to reducing basal area and yield of Thurber's needlegrass (Britton et al. 1990a). The fine leaves and densely tufted growth form make this grass susceptible to subsurface charring of the crowns (Wright and Klemmedson 1965). Although timing of fire highly influenced the response and mortality of Thurber's needlegrass, smaller bunch sizes were less likely to be damaged by fire (Wright and Klemmedson 1965). Thurber's needlegrass often survives fire and will continue growth or regenerate from tillers when conditions are favorable (Koniak 1985, Britton et al. 1990a). Reestablishment on burned sites has been found to be relatively slow due to low germination and competitive ability (Koniak 1985). Cheatgrass has been found to be a highly successful competitor with seedlings of this needlegrass and may preclude reestablishment (Evans and Young 1978).

Indian ricegrass is fairly fire tolerant (Wright 1985), which is likely due to its low culm density and below-ground root crowns. Vallentine (1989) cites several studies in the sagebrush zone that classified Indian ricegrass as being slightly damaged from late summer burning. Indian ricegrass has also been found to reestablish on burned sites through seed dispersed from adjacent unburned areas (Young 1983, West 1994). Thus the presence of surviving, seed producing plants facilitates the reestablishment of Indian ricegrass. Grazing management following fire to promote seed production and establishment of seedlings is important.

Squirreltail is considered more fire tolerant than Indian ricegrass due to its small size, coarse stems, broad leaves and generally sparse leafy material (Wright 1971, Britton et al. 1990). Postfire regeneration occurs from surviving root crowns and from on-and off-site seed sources. Bottlebrush squirreltail has the ability to produce large numbers of highly germinable seeds, with relatively rapid germination (Young and Evans 1977) when exposed to the correct environmental cues. Early spring growth and ability to grow at low temperatures contribute to the persistence of bottle brush squirreltail among cheatgrass dominated ranges (Hironaka and Tisdale 1972).

Sandberg bluegrass, a minor component of this ecological site, has been found to increase following fire likely due to its low stature and productivity (Daubenmire 1975). Reduced bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species to occupy interspaces, leading to increased fire frequency and potentially an annual plant community. Sandberg bluegrass increases under grazing pressure (Tisdale and Hironaka 1981) and is capable of co-existing with cheatgrass. Excessive sheep grazing favors Sandberg bluegrass; however, where cattle are the dominant grazers, cheatgrass often dominates (Daubenmire 1970). Thus, depending on the season of use, the grazer and site conditions, either Sandberg bluegrass or cheatgrass may become the dominant understory with inappropriate grazing management. Repeated frequent fire in this community will eliminate big sagebrush and severely decrease or eliminate the deep rooted perennial bunchgrasses from the site and facilitate the establishment of an annual weed community with varying amounts of Sandberg bluegrass and rabbitbrush.

Fire will remove aboveground biomass from bluebunch wheatgrass but plant mortality is generally low (Robberecht and Defossé 1995) because the buds are underground (Conrad and Poulton 1966) or protected by foliage. Uresk et al. (1976) reported burning increased vegetative and reproductive vigor of bluebunch wheatgrass. Thus, bluebunch wheatgrass is considered to experience slight damage to fire but is more susceptible in drought years (Young 1983). Plant response will vary depending on season, fire severity, fire intensity and post-fire soil moisture availability.

Wildfire in sites with cheatgrass present could transition to cheatgrass dominated communities. Without management cheatgrass and annual forbs are likely to invade and dominate the site, especially after fire.

As ecological condition declines, big sagebrush and rabbitbrush increase and become the dominant vegetation. Needleandthread and Indian ricegrass decrease as condition declines and are eventually replaced by Sandberg's bluegrass and bottlebrush squirreltail. Cheatgrass and annual mustards are plants likely to invade this site.

#### Fire Ecology:

Fire return intervals in big sagebrush communities range from 25 to 70 years. A naturally wide variation in fire frequency in this system is expected. Fire is the principal means of renewal for decadent stands of big sagebrush. Basin big sagebrush is readily killed when aboveground plant parts are charred by fire. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire. Wyoming big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. 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. Needleandthread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread is classified as slightly to 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. 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. Thurber's needlegrass is moderately resistant, but depending on season of burn,

phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Burning has been found to decrease the vegetation and reproductive vigor. Early season burning is more damaging to this needlegrass than late season burning.

## 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 (%)
<b>Grass/Grasslike</b>					
1	<b>Primary Perennial Grasses</b>			392-616	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	168-280	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	112-168	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	112-168	–
2	<b>Secondary Perennial Grasses</b>			22-168	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	6-34	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	6-34	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	6-34	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	6-34	–
<b>Forb</b>					
3	<b>Perennial Forbs</b>			22-90	
	aster	ASTER	<i>Aster</i>	6-22	–
	buckwheat	ERIOG	<i>Eriogonum</i>	6-22	–
	lupine	LUPIN	<i>Lupinus</i>	6-22	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	6-22	–
<b>Shrub/Vine</b>					
4	<b>Primary Shrubs</b>			191-336	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	84-140	–
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	81-140	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	22-56	–
5	<b>Secondary Shrubs</b>			22-112	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	11-22	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	11-22	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	11-22	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 4.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 16. Community 5.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 17. Community 5.3 plant community composition

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

Livestock Interpretations: This site has limited value for livestock grazing, due to steep slopes. Grazing management should be keyed to dominant grasses and palatable shrubs production. 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. 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. Thurber's needlegrass species begin growth early in the year and remain green throughout a relatively long growing season. This pattern of development enables animals to use Thurber's needlegrass when many other grasses are unavailable. Cattle prefer Thurber's needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Thurber's needlegrasses are grazed in the fall only if the fruits are softened by rain. Basin big sagebrush may serve as emergency food during severe winter weather, but it is not usually sought out by livestock. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. 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. 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: Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. 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. Thurber needlegrass is valuable forage for wildlife. 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. Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. 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. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. 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 medium to high. Permeability is moderate. Hydrologic soil groups are B and C. Rills are none to rare. Rock fragments armor the soil surface. Water flow patterns are none to rare. Rock fragments armor the soil surface. Pedestals are none to rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

Gullies are none to rare. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., needleandthread] 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

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source. Some Native American peoples used the bark of big sagebrush to make rope and baskets. Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour.

### Other information

Needleandthread is useful for stabilizing eroded or degraded sites. Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed. Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish. 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.

### Inventory data references

NASIS soil component data.

### Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T37N R37E S24
UTM zone	N
UTM northing	4546612
UTM easting	435804
Latitude	41° 4'5"
Longitude	117° 45'50"
General legal description	NW¼ North of Winnemucca, Krumm Hills area, Humboldt County, Nevada.

### Other references

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

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

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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 to rare. Rock fragments armor the soil surface.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare. Rock fragments armor the soil surface.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition.

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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 is 30-40%.

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

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

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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) expected to move distance of slope length during intense summer convection storms or rapid snowmelt events. 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 3 to 6 on most soil textures found on this site. Areas of this site occurring on soils that have a physical crust will probably have stability values less than 3. (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 typically thick platy or massive. Soil surface colors are dark 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., needleandthread] 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):** Compacted layers are not typical. Platy, subangular blocky, or massive sub-surface horizons or duripans are

not to be interpreted as compacted layers.

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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

**Sub-dominant:** Tall shrubs (big sagebrush) > shallow-rooted, cool season, perennial bunchgrasses > associated shrubs > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial and annual 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 (<20%) have dead centers.
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14. **Average percent litter cover (%) and depth ( in):** Within plant interspaces ( $\pm 20\%$ ) and depth of litter is  $< \frac{1}{2}$  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 (end of May)  $\pm 1000$  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, Utah juniper, and snakeweed. Invaders include halogeton, Russian thistle, bassia, annual mustards, galleta, and cheatgrass.**
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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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