Ecological site R024XY029NV
SOUTH SLOPE 12-16 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 ecological site is found on all but north facing sideslopes of hills and mountains with slopes greater than 30 percent. The soils associated with this site are deep to moderately deep, well drained and formed in residuum/colluvium derived from volcanic and metamorphic parent material. The soil profile is characterized by a dark colored surface horizon (mollic epipedon), a layer of clay accumulation (argillic horizon), and greater than 35 percent rock fragments thought out the profile. Important abiotic factors contributing to the presence of this ecological site include a south-west to south-east aspects and an aridic bordering on xeric soil moisture regime that contributes to a more droughty site concept than the precipitation zone would suggest. The reference plant community is dominated by mountain big sagebrush and bluebunch wheatgrass

Associated sites

R024XY021NV	**Loamy Slope 12-14 P.Z.** This ecological site is on lower mountain side slopes, toe-slopes and inter-mountain valley fans on all aspects. Soils are moderately deep, well drained, and formed in residuum/colluvium derived from volcanic parent material.
R024XY032NV	**LOAMY SLOPE 14+ P.Z.** The soil profile is characterized by a mollic (pachic) epipedon and greater than 35 percent rock fragments by volume.

R024XY023NV	**NORTH SLOPE 14+ P.Z.** The soil profile is characterized by a pachic epipedon and greater than 35 percent rock fragments in the particle size control section. The north aspect and the thick mollic epipedon reflecting the increased vegetative production due to increased available soil moisture.
R024XY027NV	**CLAYPAN 12-16 P.Z.** Soils are moderately deep, well drained and formed in residuum derived from volcanic parent material. Sites include an abrupt boundary in the upper soil profile that results in wet non-satiated conditions during the spring and early summer. Under natural conditions the reference state is dominated by low sagebrush (ARAR8), Idaho fescue (FEID), and bluebunch wheatgrass (PSSPS).
R024XY034NV	**STONY LOAM 14+ P.Z.** Idaho fescue (FEID)- bluebunch wheatgrass (PSSPS) codominant grasses with mountain brome (BRMA4); aspect dominated by heterogeneous mixture of mountain browse species, including Utah serviceberry (AMUT), oceanspray (HODU), snowberry (SYMPH), basin big sagebrush (ARTRT), currant (RIBES) and mountain big sagebrush (ARVA2).

Similar sites

R024XY035NV	**SHALLOW LOAM 10-14 P.Z.** Thurber's needlegrass (ACTH7)- bluebunch wheat grass (PSSPS) codominant grasses
R024XY021NV	**Loamy Slope 12-14 P.Z.** Idaho fescue (FEID)- Bluebunch wheat grass (PSSPS) codominant grasses
R024XY028NV	**SOUTH SLOPE 8-12 P.Z.** Mountain big sagebrush (ARTRV) & Wyoming big sagebrush (ARTRW8) common; less productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata subsp. vaseyana*
Herbaceous	(1) *Pseudoroegneria spicata*

Physiographic features

This ecological site is on side slopes of hills and mountains. Aspects are typically all except north facing. Slopes are 15 to 75 percent are typical, but slope gradients of 30 to 50 percent are typical. Elevations are 7,000 to 9,000 feet (2,133 to 2,743 m). Runoff on this site is high to very high.

Table 2. Representative physiographic features

Landforms	(1) Mountain range > Mountain slope
Runoff class	High to very high
Elevation	0 m
Slope	30 – 50 %
Aspect	W, E, SE, S, SW

Climatic features

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, somewhat dry summers. Average annual precipitation is 12 to 16 inches (30 to 41cm). Mean annual air temperature is 41 to 43 degrees F. The average growing season is about 70 to 100 days. Representative weather stations are not available for this site.

Table 3 Representative climatic features

Frost-free period (characteristic range)	80-100 days
Freeze-free period (characteristic range)	60-80 days
Precipitation total (characteristic range)	310-410 mm
Frost-free period (actual range)	70-110 days
Freeze-free period (actual range)	50-80 days
Precipitation total (actual range)	280-430 mm
Frost-free period (average)	90 days
Freeze-free period (average)	70 days
Precipitation total (average)	360 mm

Influencing water features

There are no influencing water features associated with this site.

Wetland description

N/A

Soil features

The soils associated with this site are deep to moderately deep and well drained. The soils are formed in residuum and colluvium derived from volcanic and metamorphic parent material. The soil profile is characterized by a dark surface horizon (mollic epipedon), a layer of clay accumulation (argillic horizon), and greater than 35 percent rock fragments distributed throughout the profile. Rooting depth and soil moisture storage is limited by hard bedrock at 50 to 100cm.
Representative soil components associated with this site include: Sumine, Slaven, Golsum, and Quarz.

Table 4. Representative soil features

Parent material	(1) Colluvium – volcanic rock (2) Residuum – volcanic rock
Surface texture	(1) Very cobbly loam (2) Very gravelly loam (3) Gravelly loam
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	50 – 100 cm
Surface fragment cover <=3"	20 – 40 %
Surface fragment cover >3"	10 – 30 %
Available water capacity (0-101.6cm)	6.35 – 10.16 cm
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	30 – 60 %
Subsurface fragment volume >3" (Depth not specified)	10 – 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 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 (Dobrowolski et al. 1990). 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).

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). Mountain big sagebrush are generally long-lived; therefore it is not necessary for new individuals to recruit every year for perpetuation of the stand. Infrequent large recruitment events and simultaneous low, continuous recruitment is the foundation of population maintenance (Noy-Meir 1973). Survival of the seedlings is dependent on adequate moisture conditions.

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 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 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 (Bromus tectorum) has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al. 2007).

Production will be higher on sites with deeper soils. Overgrazing by livestock and horses will cause a decrease in deep-rooted perennial bunchgrasses, mainly Thurber needlegrass and bluebunch wheatgrass. As grass cover declines, the potential for invasion by annual non-native species likely cheatgrass as well as invasion by singleleaf pinyon (Pinus monophylla) and Utah juniper (Juniperus osteosperma) will increase. Continued inappropriate grazing management may result in an increase in Sandberg bluegrass (Poa secunda), balsamroot (Balsamorhiza spp.), lupine (Lupinus spp.), sagebrush, and rabbitbrush (Chrysothamnus viscidiflorus).

This ecological site has low to medium resilience to disturbance and resistance to invasion. Increased resilience increases with elevation, aspect, increased precipitation and increased nutrient availability.

Fire Ecology:

Pre-settlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years (Burkhardt and Tisdale 1969, and Miller et al. 2000). Mountain big sagebrush is killed by fire (Neunschwander 1980, Blaisdell et al. 1982) and does not resprout (Blaisdell 1953). Post fire regeneration occurs from seed and will vary depending on site characteristics, seed source, and fire characteristics. Mountain big sagebrush seedlings can grow rapidly and may reach reproductive maturity within 3 to 5 years (Bunting et al. 1987). Mountain big sagebrush may return to pre-burn density and cover within 15-20 years following fire, but establishment after severe fires may proceed more slowly (Bunting et al. 1987). The introduction of annual weedy species, like cheatgrass, may cause an increase in fire frequency and eventually lead to an annual dominated community. Conversely, as fire frequency decreases, sagebrush will increase and the potential for encroachment by piñon and juniper also increases. Eventually, piñon and juniper will dominate the site and mountain big sagebrush will be severely reduced along with the herbaceous understory. Idaho fescue may remain underneath trees on north facing slopes. The potential for soil erosion increases as the juniper woodland matures and the understory plant community cover declines. Catastrophic wildfire in juniper controlled sites may lead to an annual weed dominated site.

Depending on fire severity, rabbitbrush, Utah serviceberry (Amelanchier utahensis), desert peach (Prunus andersonii) and mountain snowberry (Symphoricarpos orbiculatus) may increase after fire due to their ability to sprout. Douglas' rabbitbrush is top-killed by fire, but sprouts vigorously after fire (Kuntz 1982, Akinsoji 1988). Mountain snowberry is also top-killed by fire, but resprouts after fire from rhizomes (Leege and Hickey 1971, Noste and Bushey 1987). Snowberry has been noted to regenerate well and exceed pre-burn biomass in the third season after a fire (Merrill et al. 1982). Utah serviceberry resprouts from the root crown. If balsamroot is common before fire, they will increase after fire or with heavy grazing (Wright 1985). As cheatgrass increases fire frequencies will also increase, at frequencies between 0.23 and 0.43 times a year, even sprouting shrubs such as rabbitbrush will not survive (Whisenant 1990).

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 correlated to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Wright 1971, Young 1983)

Idaho fescue response to fire varies with condition and size of the plant, season and severity of fire, and ecological conditions. Mature

Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons (Wright et al. 1979). Initial mortality may be high (in excess of 75%) on severe burns, but usually varies from 20 to 50 percent (Barrington et al 1988). Rapid burns have been found to leave little damage to root crowns, and new tillers are produced with onset of fall moisture (Johnson et al. 1994). However, Wright and others (1979) found the dense, fine leaves of Idaho fescue provided enough fuel to burn for hours after a fire had passed, thereby killing or seriously injuring the plant regardless of the intensity of the fire (Wright et al. 1979). Idaho fescue is commonly reported to be more sensitive to fire than the other prominent grass on this site, bluebunch wheatgrass (Conrad and Poulton 1966). However, (Robberecht and Defosse 1995) suggested the latter was more sensitive. They observed culm and biomass reduction with moderate fire severity in bluebunch wheatgrass, whereas a high fire severity was required for this reduction in Idaho fescue. Also, given the same fire severity treatment, post-fire culm production was initiated earlier and more rapidly in Idaho fescue (Robberecht and Defosse 1995).

Bluebunch wheatgrass has coarse stems with little leafy material, therefore the aboveground biomass burns rapidly and little heat is transferred downward into the crowns (Young 1983). Bluebunch wheatgrass was described as fairly tolerant of burning, other than in early spring in eastern Oregon (Britton et al. 1990). 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). Most authors classify the plant as undamaged by fire (Kuntz 1982).

Thurber’s needlegrass a minor component of this plant community, is moderately resistant to wildfire (Smith and Busby 1981), but can be severely damaged and have high mortality depending on season and severity of fire. Post fire regeneration usually occurs from seed, but plants that are not completely killed by fire will continue growth during favorable conditions (Koniak 1985).

Basin wildrye also a minor component of this plant community, is relatively resistant to fire, particularly dormant season fire, as plants sprout from surviving root crowns and rhizomes (Zschaechner 1985).

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**			641-1023	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	493-616	–
	mountain brome	BRMA4	*Bromus marginatus*	62-185	–
	basin wildrye	LECI4	*Leymus cinereus*	62-123	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	25-99	–
2	**Secondary Perennial Grasses**			62-185	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	7-37	–
	squirreltail	ELEL5	*Elymus elymoides*	7-37	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	7-37	–
	Idaho fescue	FEID	*Festuca idahoensis*	7-37	–
	spike fescue	LEKI2	*Leucopoa kingii*	7-37	–
	melicgrass	MELIC	*Melica*	7-37	–
	bluegrass	POA	*Poa*	7-37	–
Forb					
3	**Perennial Forbs**			62-185	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	7-62	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	7-62	–
	buckwheat	ERIOG	*Eriogonum*	7-62	–
	lupine	LUPIN	*Lupinus*	7-62	–
	phacelia	PHACE	*Phacelia*	7-62	–
	phlox	PHLOX	*Phlox*	7-62	–
Shrub/Vine					
4	**Primary Shrubs**			123-247	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	123-247	–
5	**Secondary Shrubs**			16-63	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	12-37	–

	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	12-37	–
	mormon tea	EPVI	*Ephedra viridis*	12-37	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	12-37	–
	currant	RIBES	*Ribes*	12-37	–
	snowberry	SYMPH	*Symphoricarpos*	12-37	–

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 2.4 plant community composition

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

Table 12. Community 3.1 plant community composition

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

Table 13. Community 3.2 plant community composition

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

Table 14. Community 4.1 plant community composition

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

Table 15. Community 4.2 plant community composition

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

Table 16. Community 5.1 plant community composition

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

Table 17. Community 5.2 plant community composition

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

Animal community

Livestock Interpretations: This site has limited value for livestock grazing, due to steep slopes. Grazing management should be keyed perennial grass production. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species. Mountain brome is one of the most important forage grasses in the quaking aspen zone. Mountain brome is ranked as excellent forage for both cattle and horses and good for domestic sheep. Domestic sheep will graze mountain brome only when it is fairly succulent. 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. 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. Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. 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: Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for wildlife. Bluebunch wheatgrass does not generally provide sufficient cover for ungulates, however, mule deer are frequently found in bluebunch-dominated grasslands. Mountain brome seedheads and seeds provide food for many birds and small mammals. Pronghorn antelope will consume mountain brome primarily in the spring. The palatability of mountain brome is excellent for deer, particularly during the late spring and early summer. 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. Thurber needlegrass is valuable forage for wildlife. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. 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 high to very high. Permeability is slow to moderate. Hydrologic soil group is B, C, and D. Rills are typically none. Water flow patterns are none to rare but can be expected on steeper slopes in areas recently subjected to summer convection storms or rapid snowmelt. 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., bluebunch wheatgrass]) 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

Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand. Native Americans used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing.

Other information

Mountain brome is an excellent native bunchgrass for seeding alone or in mixtures in disturbed areas, including depleted rangelands, burned areas, roadways, mined lands, and degraded riparian zones. 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

NV-ECS-1 - 5 records

Type locality

Location 1: Humboldt County, NV	
Township/Range/Section	T35N R38E S14
UTM zone	N

UTM northing	4528870
UTM easting	443536
Latitude	40° 54′32″
Longitude	117° 40′13″
General legal description	SE¼ Approximately 6 miles southeast of Winnemucca, Thomas Canyon area, Sonoma Range, Humboldt County, Nevada. This site also occurs Eureka, Lander, and Pershing Counties, Nevada.

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Contributors

P NovakEchenique
E. Hourihan
A. Argullin
CK/GKB
T. Stringham

Approval

Kendra Moseley, 3/07/2025

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	03/18/2010
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** **Water flow patterns are none to rare but can be expected on steeper slopes in areas recently subjected to summer convection storms or rapid snowmelt.**

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.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare Ground ± 5-10 percent.**

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

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

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.**

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. (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 thin platy, subangular blocky, or granular. Soil surface colors are dark and are typified by a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 1 to 3 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., bluebunch wheatgrass]) 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 none. Subangular blocky, prismatic, or massive sub-surface horizons or subsoil argillic horizons are not to be interpreted as compacted.

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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 (mountain big sagebrush) > associated shrubs > shallow-rooted, cool season, perennial bunchgrasses > 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 20% of total woody canopy; some of the mature bunchgrasses (less than10%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (± 35%) and litter depth is ± ½ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through mid-June) ± 1100 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, snakeweed, 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. Little growth occurs in drought years.**
