Ecological site R028AY065NV SHALLOW LOAM 14+ 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): 028A–Ancient Lake Bonneville

MLRA 28A occurs in Utah (82%), Nevada (16%), and Idaho (2%). It makes up about 36,775 square miles. A large area west and southwest of Great Salt Lake is a salty playa. This area is the farthest eastern extent of the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes. They are not well dissected because of low rainfall in the MLRA. Most of the valleys are closed basins containing sinks or playa lakes. Elevation ranges from 3,950 to 6,560 ft. in the basins and from 6,560 to 11,150 ft. in the mountains. Most of this area has alluvial valley fill and playa lakebed deposits at the surface. Great Salt Lake is all that remains of glacial Lake Bonneville. A level line on some mountain slopes indicates the former extent of this glacial lake. Most of the mountains in the interior of this area consist of tilted blocks of marine sediments from Cambrian to Mississippian age. Scattered outcrops of Tertiary continental sediments and volcanic rocks are throughout the area. The average annual precipitation is 5 to 12 ins. in the valleys and is as much as 49 ins. in the mountains. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The driest period is from midsummer to early autumn. Precipitation in winter typically occurs as snow. The average annual temperature is 39 to 53 °F. The freeze-free period averages 165 days and ranges from 110 to 215 days, decreasing in length with elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. The soils in the area dominantly have a mesic or frigid soil temperature regime, an aridic or xeric soil moisture regime, and mixed mineralogy. They generally are well drained, loamy or loamy-skeletal, and very deep.

Ecological site concept

This site occurs on smooth to convex sideslopes of mountains on all aspects. Slopes range from 4 to 50 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 6200 to over 10500 feet. The climate associated with this site is semiarid, characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 14 to over 22 inches. Mean annual air temperature is 40 to 43 degrees F. The average growing season is about 50 to 70 days. The soils associated with this site typically shallow to moderately deep. The soils are formed in colluvium and residuum from granite, quartzite or limestone. The soils have a mollic epipedon that extends from the soil surface to bedrock contact. The soil moisture regime is xeric and the soil temperature regime is frigid or cryic. Available water capacity is low to moderate. These soils have a high amount of gravels, cobbles and stones throughout the profile. This site provides a cool, moist environment for plant growth because of the elevations at which it occurs. Runoff is high to very high. The reference state is dominated by bluebunch wheatgrass and mountain big sagebrush. Other common plants include muttongrass, Indian ricegrass, basin wildrye and snowberry. Production ranges from 400 to 800 pounds per acre.

Associated sites

F028AY080NV	ABCOC-PSMEG (White Fir-Douglas Fir)
R028AY057NV	LOAMY 16+ P.Z.
R028AY059NV	MAHOGANY SAVANNA

R028AY061NV	**CLAYPAN 14+ P.Z.**
R028AY068NV	**LOAMY SLOPE 16+ P.Z.**

Similar sites

R028AY068NV	**LOAMY SLOPE 16+ P.Z.** BRMA4-ACHNA-ELTR7 codominant grasses; more productive site
R028AY057NV	**LOAMY 16+ P.Z.** BRMA4-ACHNA-ELTR7 codominant grasses: more productive site: soils deep and very deep
R028AY067NV	**CALCAREOUS LOAM 14+ P.Z.** More productive site
R028AY064NV	**SHALLOW LOAM 10-14 P.Z.** PSSPS-ACHY codominant grasses

Table 1. Dominant plant species

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

Physiographic features

This site occurs on smooth to convex sideslopes of mountains on all aspects. Slopes range from 4 to 50 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 6200 to over 10,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Mountain slope
Elevation	1,890 – 3,200 m
Slope	0 – 50 %

Aspect	Aspect is not a significant factor

Climatic features

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating.
Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 14 to over 22 inches. Mean annual air temperature is 40 to 43 degrees F. The average growing season is about 50 to 70 days.

The Mean annual precipitation at the Great Basin Natinal Park Climate Station (263340) is 13.33 inches.

Monthly mean precipitation is:
January 1.05; February 1.18; March 1.37; April 1.21; May 1.24; June .87; July .97; August 1.18; September 1.08; October .96; December .96

Table 3 Representative climatic features

Frost-free period (average)	0 days
Freeze-free period (average)	60 days
Precipitation total (average)	430 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site typically shallow to moderately deep. The soils are formed in colluvium and residuum from granite, quartzite or limestone. The soils have a mollic epipedon that extends from the soil surface to bedrock contact. The soil moisture regime is xeric and the soil temperature regime is frigid or cryic. These soils have a high amount of gravels, cobbles and stones throughout the profile. This site provides a cool, moist environment for plant growth because of the elevations at which it occurs. Runoff is high to very high. The soil temperature regime is cryic and the soil moisture regime is xeric. The soil series associated with this site include: Badhap, Buzztail, Canyoung, Goodski, Growset, and Wardbay.

The representative soil series is Goodski, a Loamy-skeletal, mixed, superactive Pachic Haplocryolls. Diagnostic horizons include an Mollic epipedon from 0 to 76 cm. Clay content in the particle control section averages 12 to 18 percent. Rock fragments range from 35 to

60 percent, mainly gravel. Reaction is neutral. Effervescence is none. Lithology consists of granite.

Table 4. Representative soil features

Parent material	(1) Colluvium – granite (2) Residuum – limestone (3) Colluvium – quartz-monzonite
Surface texture	(1) Very gravelly loam (2) Very gravelly loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	40 – 110 cm
Surface fragment cover <=3"	30 – 60 %
Surface fragment cover >3"	10 %
Available water capacity (0-101.6cm)	3.81 – 10.41 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 40 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified

Soil reaction (1:1 water) (0-101.6cm)	6.8 – 8.2
Subsurface fragment volume <=3" (Depth not specified)	40 – 60 %
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).

The 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). 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.

Mountain big sagebrush, Utah serviceberry, and mountain snowberry 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. Aroga moth can partially or entirely kill individual big sagebrush plants (Furniss and Barr 1975), however it is unlikely that entire stands of sagebrush will be severely affected in sites at high elevation such as this.

The perennial bunchgrasses that are co-dominant with the shrubs include bluebunch wheatgrass, muttongrass, blue grama, Indian ricegrass and squirreltail. These species 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. Differences in root depth distributions between grasses and shrubs result 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 uptake 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). Dobrowolski et al. (1990) cite multiple authors on the extent of the soil profile exploited by the competitive exotic annual cheatgrass. Specifically, the depth of rooting is dependent on the size the plant achieves and in competitive environments cheatgrass roots were found to penetrate only 15 cm whereas isolated plants and pure stands were found to root at least 1 m in depth with some plants rooting as deep as 1.5 to 1.7 m.
The ecological site has moderate to high resilience to disturbance and resistance to invasion. Resilience increases with elevation, aspect, precipitation, and nutrient availability. Long-term disturbance response may be influenced by small differences in landscape topography. Concave areas receive run-in from adjacent landscapes and consequently retain more moisture to support the growth of deep-rooted perennial grasses (i.e. bluebunch wheatgrass) whereas convex areas where runoff occurs are slightly less resilient and may have more shallow-rooted perennial grasses (i.e. muttongrass). North slopes are also more resilient than south slopes because lower soil surface temperatures operate to keep moisture content higher on northern exposures. Two possible alternative stable states have been identified for this site.

Fire Ecology:
Fire is believed to be the dominant disturbance force in natural big sagebrush communities. Several authors suggest pre-settlement fire

return intervals in mountain big sagebrush communities varied from 15 to 25 years (Burkhardt and Tisdale 1969, Houston 1973, and Miller et al. 2000). Kitchen and McArthur (2007) suggest a mean fire return interval of 40 to 80 years for mountain big sagebrush communities. The range from 15 to 80 years is probably more accurate and reflects the differences in elevation and precipitation where mountain big sagebrush communities occur. On a landscape scale, multiple seral stages were represented in a mosaic reflecting periodic reoccurrence of fire and other disturbances (Crawford et al 2004). 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. Fire adaptation by herbaceous species is generally superior to the dominant shrubs, which are typically killed by fire. 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).

Mountain big sagebrush is killed by fire (Neuenschwander 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).

Depending on fire severity, Utah serviceberry, creeping barberry and snowberry may increase after fire. Snowberry and creeping barberry are 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 will sprout from the root crown following fire.

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). Muttongrass, a minor component on this site, is top killed by fire but will resprout after low to moderate severity fires. A study by Vose and White (1991) in an open sawtimber site found minimal difference in overall effect of burning on mutton grass.
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.

State and transition model

Figure 5. State and Transition Model

Figure 6. Legend

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**			437-639	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	404-538	–
	muttongrass	POFE	*Poa fendleriana*	34-101	–
2	**Secondary Perennial Grasses**			34-67	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	3-20	–
	blue grama	BOGR2	*Bouteloua gracilis*	3-20	–
	squirreltail	ELEL5	*Elymus elymoides*	3-20	–
	needle and thread	HECO26	*Hesperostipa comata*	3-20	–
	basin wildrye	LECI4	*Leymus cinereus*	3-20	–
	Sandberg bluegrass	POSE	*Poa secunda*	3-20	–
Forb					
3	**Perennial**			34-101	
	buckwheat	ERIOG	*Eriogonum*	3-20	–

	lupine	LUPIN	*Lupinus*	3-20	–
	beardtongue	PENST	*Penstemon*	3-20	–
	phlox	PHLOX	*Phlox*	3-20	–
Shrub/Vine					
4	**Primary Shrubs**			81-188	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	67-135	–
	snowberry	SYMPH	*Symphoricarpos*	13-54	–
5	**Secondary Shrubs**			34-101	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	7-20	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	7-20	–
Tree					
6	**Evergreen**			7-27	
	limber pine	PIFL2	*Pinus flexilis*	3-13	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	3-13	–

Table 6. Community 1.2 plant community composition

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

Table 7. Community 1.3 plant community composition

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

Animal community

Livestock Interpretations: This site is suitable for livestock grazing. Considerations for grazing management including timing, intensity and duration of grazing. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Bluebunch wheatgrass is moderately grazing tolerant and is very sensitive to defoliation during the active growth period (Blaisdell and Pechanec 1949, Laycock 1967, Anderson and Scherzinger 1975, Britton et al. 1990). Herbage and flower stalk production was reduced with clipping at all times during the growing season; however, clipping was most harmful during the boot stage (Blaisdell and Pechanec 1949). Tiller production and growth of bluebunch was greatly reduced when clipping was coupled with drought (Busso and Richards 1995). Mueggler (1975) estimated that low vigor bluebunch wheatgrass may need up to 8 years rest to recover. Although an important forage species, it is not always the preferred species by livestock and wildlife. Muttongrass is a widespread forage grass. It is one of the earliest grasses in the spring and is sought by domestic livestock and several wildlife species. Muttongrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. 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. Snowberry is readily eaten by all classes of livestock, particularly domestic sheep. Inappropriate grazing management leads to a decline in understory plants like bluebunch wheatgrass and an increase in big sagebrush. Muttongrass many increase temporarily with further degradation. Invasion of annual weedy forbs and cheatgrass could occur with further grazing degradation, leading to an increase in bare ground. A combination of overgrazing and prolonged drought may lead to soil redistribution, increased bare ground and a loss in plant production. 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: Many wildlife species are dependent on the sagebrush ecosystem including the greater sage grouse, sage sparrow, pygmy rabbit and the sagebrush vole. Dobkin and Sauder (2004) identified 61 species, including 24 mammals and 37 birds, associated with the shrub-steppe habitats of the Intermountain West. Mountain big sagebrush is important to wildlife for both food and cover. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer, elk and pronghorn. Elk (Alces alces) and pronghorn antelope (Antilocapra americana) prefer mountain big sagebrush over basin and Wyoming sagebrush (Beale and Smith 1970, Wambolt 1996). A study by Brown (1977) determined that desert bighorn sheep (Ovis canadensis nelisoni) preferred big sagebrush over other shrub types; however, the variety was not noted. Welch and Wagstaff (1992) noted in a study near Provo, Utah, mountain big sagebrush was highly preferred winter forage of mule deer (Odocoileus hemionus) over other available forage. Other studies have determined, in the same study area, that mountain big sagebrush is preferred by both wintering domestic sheep as well as mule deer (Welch et al. 1986). Furthermore, wildlife use a variety of associated understory plants and soils that occur in basin big sagebrush habitat. For example: sage grouse (Centrocercus urophasianus), sagebrush vole (Lemmiscus curtatus), Merriam's shrew (Sorex merriami) and Preble's shrew (Sorex preblei) use the grasses that occur with mountain big sagebrush for nesting, cover and forage. Mountain big sagebrush sandy soil sites provide burrowing opportunities and protection from predators for burrowing owls (Athene cunicularia), dark and pale kangaroo mice (Microdipodops megacephalus and Microdipodops pallidus, respectively). Mountain big sagebrush that occur on woodland and rock ecotnes provides nesting and foraging habitat for the ferruginous hawk (Buteo regalis) (Nevada Wildlife Action Plan 2012). Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use mutton grass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas. Several reptiles and amphibians are distributed throughout the sagebrush steppe in the west in Nevada, where basin big sagebrush is known to grow (Bernard and Brown 1977). Reptile species including: eastern racers (Coluber constrictor), ringneck snakes (Diadophis punctatus), night snakes (Hypsiglena torquata), Sonoran mountain kingsnakes (Lampropeltis pyromelana), striped whipsnakes (Masticophis taeniatus), gopher snakes (Pituophis catenifer), long-nosed snakes (Rhinoceheilus lecontei), wandering garter snakes (Thamnophis elegans vagrans), Great Basin rattlesnakes (Crotalus oreganus lutosus), Great Basin collared lizard (Crotaphytus bicinctores), long-nosed leopard lizard (Gambelia wislizenii), short-horned lizard (Phrynosoma douglassi), desert-horned lizard (Phrynosoma platyrhinos), sagebrush lizards (Sceloporus graciosus), western fence lizards (Sceloporus occidentalis), northern side-blotched lizards (Uta uta stansburiana), western skinks (Plestiodon skiltonianus), and Great Basin whiptails (Aspidoscelis tigris) occur in areas where sagebrush is dominant. Similarly, amphibians such as: western toads (Anaxyrus boreas), Woodhouse’s toads (Anaxyrus woodhousii), northern leopard frogs (Lithobates pipiens), Columbia spotted frogs (Rana luteiventris), bullfrogs (Lithobates catesbeianus), and Great Basin spadefoots (Spea intermontana) also occur throughout the Great Basin in areas sagebrush species are dominant (Hamilton 2004). Studies have not determined if reptiles and amphibians prefer certain species of sagebrush; however, researchers agree that maintaining habitat where basin big sagebrush and reptiles and amphibians occur is important. In fact, wildlife biologists have noticed declines in reptiles where sagebrush steppe habitat has been seeded with introduced grasses (West 1999 and ref. therein). Sagebrush communities are important for maintaining lagomorph and rodent populations. Pygmy rabbits, sagebrush obligates, use sites with big sagebrush at a higher intensity than low sagebrush sites (Heady and Laundre 2005). A study by Larrison and Johnson (1973) captured more deer mice in big sagebrush communities than in any other plant community. Although specific varieties of big sagebrush are not mentioned in these studies, thus, suggests that deer mice prefer big sagebrush plant communities where mountain big sagebrush are present, for cover over other plant communities. It should be noted that sagebrush-grassland communities provide critical sage-grouse (Centrocercus urophaianus) 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. Common snowberry is considered important browse for many types of wildlife. Bighorn sheep use common snowberry regularly during the summer. Forage value to elk is fair. Common snowberry is important as both cover and food for bird and small mammal populations. These include sharp-tailed, ruffed, and blue grouse, wild turkey and, several non-game species of bird including the kingbird, western flycatcher, and western bluebird. Among small mammals that rely on common snowberry are fox squirrels, desert cottontails, and pocket gopher. 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.

Hydrological functions

Permeability is moderate to moderately rapid. Runoff is high to very high. Hydrologic soil groups are B and D.

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

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.

Type locality

Location 1: White Pine County, NV	
Township/Range/Section	T13N R69E S21
Latitude	38° 59′5″
Longitude	114° 14′0″

General legal description	About ½ mile east of Baker Creek Campground, north side of road, Great Basin National Park, Snake Range, White Pine County, Nevada.
Location 2: White Pine County, NV	
Township/Range/Section	T11N R69E S3
Latitude	38° 51′16″
Longitude	114° 12′53″
General legal description	About ½ mile east of Lexington Creek trail, Great Basin National Park, Snake Range, White Pine County, Nevada.

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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)	P.Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	03/23/2015
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. A few may occur on steeper slopes after summer convection storms or rapid snowmelt. These will begin to heal during the next growing season.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few may occur on steeper slopes after summer convection storms or rapid snowmelt. They are typically short, short (<2m), meandering and not connected.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are 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 5-20% depending on amount of surface rock fragments.

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5. **Number of gullies and erosion associated with gullies:** None

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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 large rainfall 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 4 to 6 on most soil textures found on this site.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is subangular blocky or fine granular. Soil surface colors are dark browns and soils are typified by a mollic epipedon. Surface textures are very gravelly loams. Organic matter of the surface 2 to 3 inches is typically 0.5 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 (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 or massive sub-surface horizons 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 State: Deep-rooted, cool season, perennial bunchgrasses >

Sub-dominant: tall shrubs (i.e., mountain 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: evergreen trees, warm season rhizamotous grasses

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 20-30% and depth of litter 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 (thru June) ± 600 lbs/ac; Favorable years ± 800 lbs/ac and unfavorable years ±400 lbs/ac**

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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 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. Reduced growth and reproduction occurs during extended or extreme drought conditions.**
