

Ecological site R023XY044NV VERY COBBLY CLAYPAN

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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.

Ecological site concept

Currently there is only a draft of the initial concept for this ecological site. The initial concept for this site places it within the Cobbly Mod Deep Clay 10-14 PZ Low or Lahontan Sagebrush and Sandberg bluegrass Ecological Site Group. To view the General STM and other information available for this ESG please go to <https://edit.jornada.nmsu.edu/catalogs/esg/023X/R023XY904NV>

The Very Cobbly Claypan ecological site is the modal site for this group. This site occurs on plateau summits, on the summit and shoulders of rock pediments and upper piedmont slopes, and on interplateau basins. Slopes range from 0 to 15 percent, but slope gradients of 2 to 4 percent are most typical. Elevations are 5000 to 6500 feet. The soils from this site have formed from residuum or colluvium derived from volcanic parent materials. These soils are characterized by dark, reddish-brown, clay textured surface soils that are underlain by clayey subsoils. In many areas the soil surface is covered with a thin, light colored, layer of silt. The soil surface has very high amounts (>75% surface cover) of cobbles and/or stones that are usually tightly interlocked. The soils are subject to swelling when saturated and shrinking with drying. The plant community is dominated by low sagebrush or Lahontan sagebrush and Sandberg bluegrass. Production is about 275 lbs/acre for a normal year.

Associated sites

R023XY001NV	CHURNING CLAY
R023XY031NV	CLAYPAN 10-14 P.Z.
R023XY033NV	CLAYEY 10-14 P.Z.

R023XY047NV	GRAVELLY CLAY 8-10 P.Z.
R023XY060NV	COBBLY CLAYPAN 8-12 P.Z.

Similar sites

R023XY059NV	GRAVELLY CLAYPAN 10-12 P.Z. ACTH7 dominant grass
R023XY031NV	CLAYPAN 10-14 P.Z. PSSPS-ACTH7 codominant; more productive site
R023XY060NV	COBBLY CLAYPAN 8-12 P.Z. PSSPS-ACTH7 codominant; more productive site
R023XY008NV	MOUNTAIN RIDGE FEID dominant grass
R023XY001NV	CHURNING CLAY ERNAW dominant shrub; fewer rock fragments at soil surface
R023XY021NV	SCABLAND 10-14 P.Z. very shallow to bedrock

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula</i>
Herbaceous	(1) <i>Poa secunda</i>

Physiographic features

This site occurs on plateau summits, on the summit and shoulders of rock pediments and upper piedmont slopes, and on interplateau basins. Slopes range from 0 to 15 percent, but slope gradients of 2 to 4 percent are most typical. Elevations are 4600 to 6500 feet.

Table 2. Representative physiographic features

Landforms	(1) Plateau
Elevation	4,600–6,500 ft
Slope	0–15%

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 10 to 14 inches. Mean annual air temperature is 44 to 49 degrees F. The average growing season is about 80 to 110 days.

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).

Average annual precipitation is 16 to over 20 inches. Mean annual air temperature is 41 to 44 degrees F. The average growing season is about 50 to 70 days.

Mean annual precipitation at the Bear Creek, Nevada SNOTEL station (170501020301) is 37.69 inches.

monthly mean precipitation is:

January 3.84; February 3.75; March 4.38; April 4.9;
 May 3.99; June 2.82; July .95; August 1.66;
 September 1.22; October 2.12;
 November 3.67; December 4.38.

Table 3. Representative climatic features

Frost-free period (average)	95 days
Freeze-free period (average)	

Precipitation total (average)

12 in

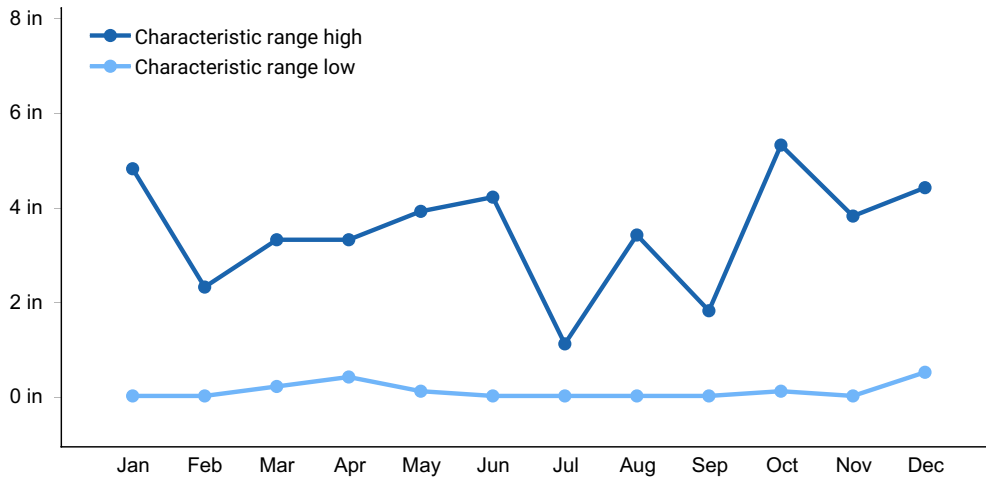


Figure 1. Monthly precipitation range

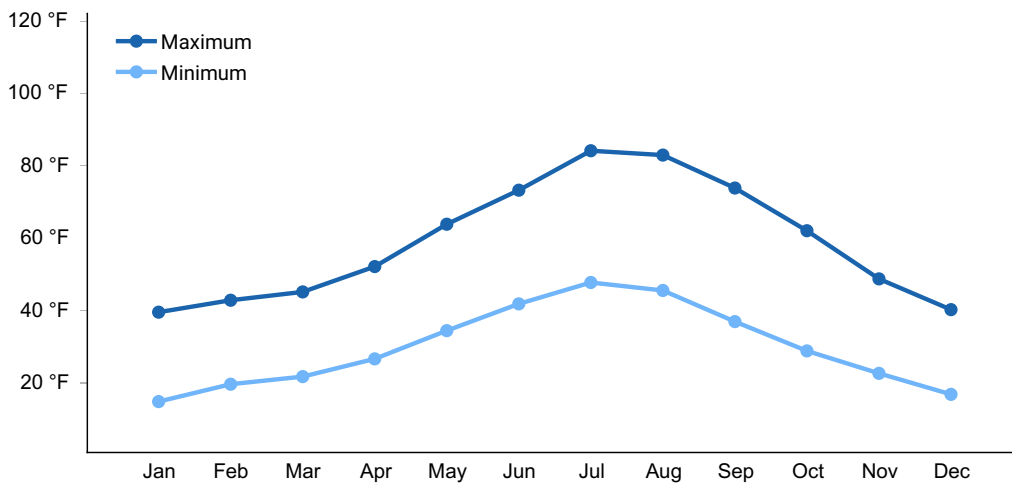


Figure 2. Monthly average minimum and maximum temperature

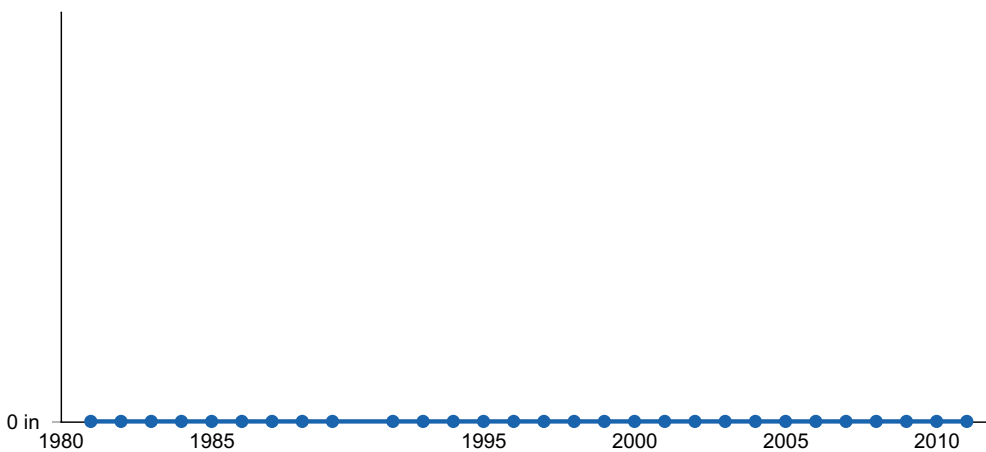


Figure 3. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site have formed in residuum or colluvium derived from volcanic parent materials. These soils are characterized by dark, reddish-brown, clay textured surface soils that are underlain by clayey subsoils. In many areas the soil surface is covered with a thin, light colored, layer of silt. The soil surface has very high amounts (>75% surface cover) of cobbles and/or stones that are usually tightly interlocked. The soils are subject to swelling when saturated and shrinking with drying. The soil series associated with this site include: Tuledad and Tunnison.

Table 4. Representative soil features

Surface texture	(1) Extremely cobbly loam (2) Very cobbly clay (3) Cobbly clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow
Soil depth	14–40 in
Surface fragment cover ≤3"	15–30%
Surface fragment cover >3"	26–44%
Available water capacity (0-40in)	2.1–4.3 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–7.8
Subsurface fragment volume ≤3" (Depth not specified)	0–28%
Subsurface fragment volume >3" (Depth not specified)	0–40%

Ecological dynamics

Thin surface soils over heavy textured subsoils or clayey surface and subsoils restrict fine-

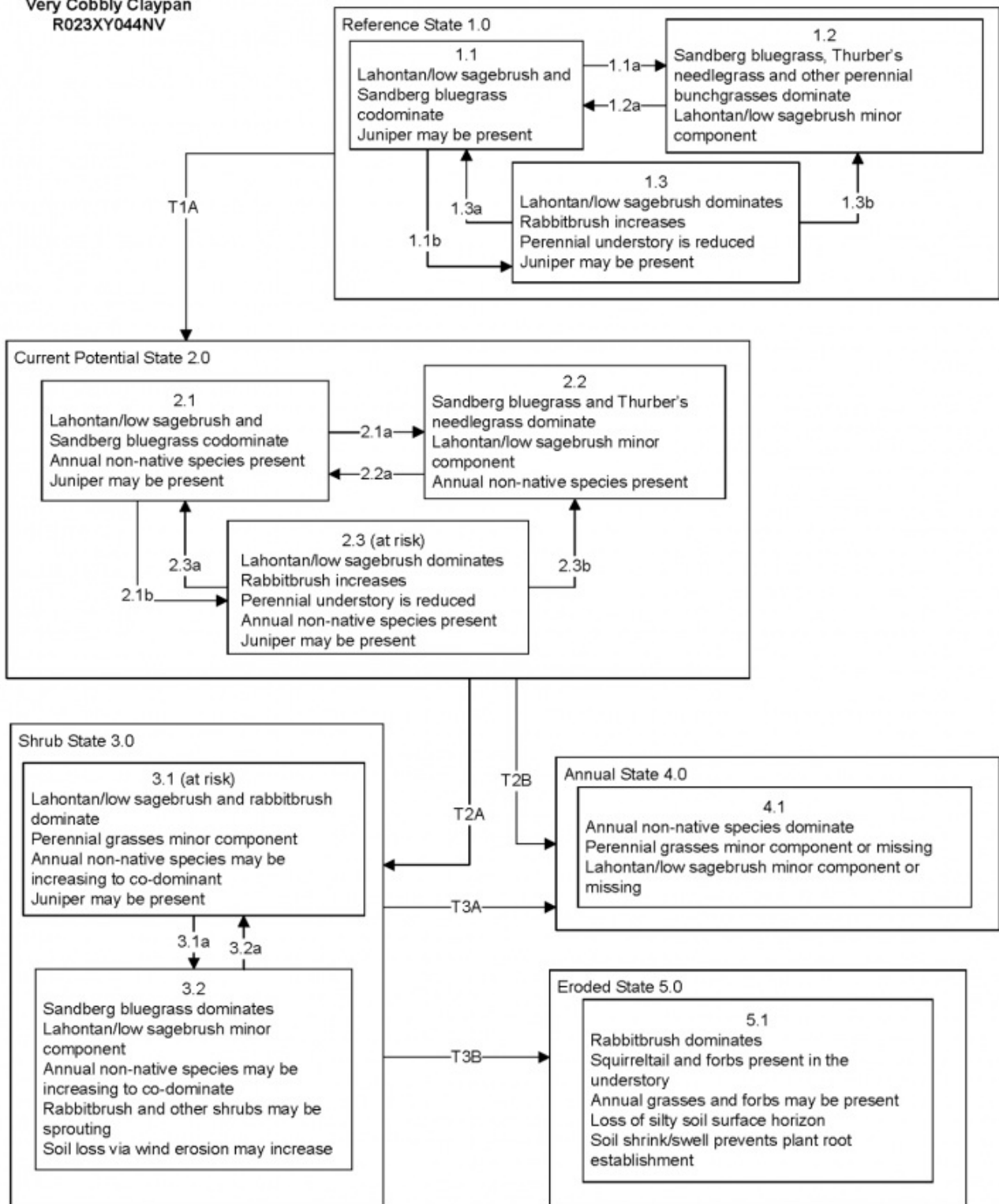
rooted grasses and forbs on this site. Shallow rooted grasses and mat forming forbs are the most prevalent herbaceous vegetation.

Fire Ecology:

Prior to 1897, mean fire return intervals for low sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Low sagebrush is very susceptible to fire damage. Low sagebrush is usually killed by fire and does not re-sprout. The recovery in burned areas is usually via small, light, wind-dispersed seed for all low sagebrush subspecies. Partially injured low sagebrush may re-grow from living branches, but sprouting does not occur. Douglas' rabbitbrush is usually top-killed by fire. It has high resin content, and both foliage and stems may be consumed, even with relatively high moisture content. Fuel distribution as well as overall fuel loading affects the potential survival of Douglas' rabbitbrush. Douglas' rabbitbrush regenerates after fire by sprouting and by establishing from off-site seed. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Thurber's needlegrass is classified as moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Early season burning is more damaging to this needlegrass than late season burning. Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire.

State and transition model

MLRA 23
 Group 4
 Very Cobbly Claypan
 R023XY044NV



MLRA 23
Group 4
Very Cobbly Claypan
R023XY044NV
KEY

Reference State 1.0 Community Phase Pathways

1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.

1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory would also reduce perennial understory.

1.2a: Time and lack of disturbance allows for shrub regeneration.

1.3a: Low severity fire or late fall/winter herbivory causing mechanical damage to sagebrush would reduce sagebrush overstory.

1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as cheatgrass.

Current Potential State 2.0 Community Phase Pathways

2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.

2.1b: Time and lack of disturbance such fire or drought. Inappropriate grazing management may also reduce perennial understory.

2.2a: Time and lack of disturbance allows for shrub regeneration.

2.3a: Low severity fire resulting in a mosaic pattern. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.

2.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T2A: Inappropriate grazing management (3.1). Fire or brush treatment; may be coupled with inappropriate grazing management (3.2).

Transition T2B: Inappropriate grazing management, soil disturbing treatments, fire or multiple fires.

Shrub State 3.0 Community Phase Pathways

3.1a: Fire or brush management (i.e. mowing) with minimal soil disturbance.

3.2a: Time and lack of disturbance (unlikely to occur).

Transition T3A: Catastrophic fire.

Transition T3B: Inappropriate grazing management.

State 1 Reference Plant Community

Community 1.1 Community Phase

The reference plant community is dominated by low sagebrush and Sandberg's bluegrass. Potential vegetative composition is about 30% grasses, 5% forbs and 65% shrubs. Approximate ground cover (basal and crown) is about 10 to 15 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	126	173	221
Grass/Grasslike	60	83	105
Forb	10	13	17
Tree	4	6	7
Total	200	275	350

Community 1.2 Community Phase

Community 1.3 Community Phase

Pathway a Community 1.1 to 1.2

Pathway b Community 1.1 to 1.3

Pathway a Community 1.3 to 1.1

Pathway b Community 1.3 to 1.2

State 2 Current Potential State

Community 2.1 Community Phase

Community 2.2
Community Phase

Community 2.3
Community Phase (at risk)

Pathway a
Community 2.1 to 2.2

Pathway b
Community 2.1 to 2.3

Pathway a
Community 2.2 to 2.1

Pathway a
Community 2.3 to 2.1

Pathway b
Community 2.3 to 2.2

State 3
Shrub State

Community 3.1
Community Phase (at risk)

Community 3.2
Community Phase

Pathway a
Community 3.1 to 3.2

Pathway a
Community 3.2 to 3.1

State 4
Annual State

Community 4.1
Community Phase

**Transition A
State 1 to 2**

**Transition A
State 2 to 3**

**Transition B
State 2 to 4**

**Transition A
State 3 to 4**

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			81–135	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	60–90	–
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	15–30	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	6–15	–
2	Secondary Perennial Grasses			6–24	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	1–6	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	1–6	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	1–6	–
	bluebunch wheatgrass	PSSPS	<i>Pseudoroegneria spicata ssp. spicata</i>	1–6	–
Forb					
3	Perennial			6–24	
	pussytoes	ANTEN	<i>Antennaria</i>	1–6	–
	aster	ASTER	<i>Aster</i>	1–6	–
	Hooker's balsamroot	BAHO	<i>Balsamorhiza hookeri</i>	1–6	–
	fleabane	ERIGE2	<i>Erigeron</i>	1–6	–
	gilia	GILIA	<i>Gilia</i>	1–6	–
	sunflower	HFI IA3	<i>Helianthus</i>	1–6	–

	Common Name	Code	Scientific Name	Height (ft)	Notes
	desertparsley	LOMAT	<i>Lomatium</i>	1–6	–
	phlox	PHLOX	<i>Phlox</i>	1–6	–
Shrub/Vine					
4	Primary Shrubs			111–174	
	little sagebrush	ARAR8	<i>Artemisia arbuscula</i>	105–150	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	6–24	–
5	Secondary Shrubs			6–15	
	wild crab apple	PERA4	<i>Peraphyllum ramosissimum</i>	3–6	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	3–6	–
	littleleaf horsebrush	TEGL	<i>Tetradymia glabrata</i>	3–6	–
Tree					
6	Evergreen			1–6	
	western juniper	JUOC	<i>Juniperus occidentalis</i>	1–6	–

Animal community

Livestock Interpretations:

This site has limited value for livestock grazing due to low forage production and stony surfaces. Sandberg bluegrass 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. Sandberg bluegrass 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. 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. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock. Domestic sheep and to a much lesser degree cattle consume low sagebrush, particularly during the spring, fall and winter. Douglas' rabbitbrush is tolerant of grazing and may be rejuvenated by foliage removal. Douglas' rabbitbrush commonly increases on degraded rangelands as more palatable species are removed.

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:

Low sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer low sagebrush, particularly in winter and early spring. 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. Douglas' rabbitbrush provides an important source of browse for wildlife, particularly in the late fall and early winter after more palatable species have been depleted. Wild ungulates show varying preference for Douglas' rabbitbrush depending on season, locality, and subspecies. Mature or partially mature plants are generally preferred to green, immature ones. Douglas' rabbitbrush provides important cover for pronghorn fawns. Sandberg bluegrass is desirable for pronghorn antelope and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range. Thurber needlegrass is valuable forage for wildlife. Bottlebrush squirreltail is a dietary component of several wildlife species.

Hydrological functions

Runoff is medium to very high. Permeability is slow. Hydrologic soil group is D. There are no rills or waterflow patterns. Extremely high amount of cobbles and stones on soil surface and low gradient slope (<4%) provide stabilizing effect for surface soils. Pedestals are none to rare. Frost heaving of shallow rooted plants and shrink-swell activity of soil are not indicators of erosion. Gullies are rare in areas of this site that occur on stable landforms. Low density of perennial herbaceous plants offers minimal impact on surface runoff or infiltration conditions. Sparse shrub canopy provides little protection from raindrop impact.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

Other products

Douglas' rabbitbrush can be a source of rubber and possibly valuable resins.

Other information

Low sagebrush can be successfully transplanted or seeded in restoration. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

Type locality

Location 1: Washoe County, NV	
Township/Range/Section	T34N R20E S23
UTM zone	N
UTM northing	272605
UTM easting	4521846
Latitude	40° 48' 58"
Longitude	119° 41' 46"
General legal description	NE 1/4, Buffalo Hills, Washoe County, Nevada. This site also occurs in Modoc County, California.

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>).

Contributors

SW/GKB

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)	GK BRACKLEY
Contact for lead author	State Rangeland Management Specialist
Date	06/20/2006
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Extremely high amount of cobbles and stones on soil surface and low gradient slope (<4%) provide stabilizing effect for surface soils.

2. **Presence of water flow patterns:** None.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Frost heaving of shallow rooted plants and shrink-swell activity of soil are not indicators of erosion.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground 5 to 15%; surface rock fragments typically >75%; shrub canopy 5 to 15%; basal area for perennial herbaceous plants <2%.

5. **Number of gullies and erosion associated with gullies:** Gullies are rare in areas of this site that occur on stable landforms.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) is expected to move the 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. Areas of this site occurring on soils that have a physical crust will probably have stability values less than 3. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface soil structure is variable and can range from granular to thin platy, subangular blocky, or massive. Soil surface colors are light and the 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.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Low density of perennial herbaceous plants offers minimal impact on surface runoff or infiltration conditions. Sparse shrub canopy provides little protection from raindrop impact.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are not typical. Massive sub-surface horizons or subsoil argillic horizons are not to be interpreted as compacted layers.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant: Reference Plant Community: Low shrubs (low sagebrush) >> shallow-rooted, cool season, perennial bunchgrasses. (By above ground production)

Sub-dominant: Associated shrubs > deep-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, annual and perennial forbs. (By above ground production)

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs are 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.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (<10%) and depth ($\pm \frac{1}{4}$ in.)

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season, ± 275 lbs/ac; Spring moisture significantly affects total production.

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Douglas' rabbitbrush and horsebrush are increasers on this site. Cheatgrass, Russian thistle, annual mustards, and medusahead are invaders on this site.

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