

Ecological site R027XY079NV

GRAVELLY CLAYPAN 8-10 P.Z.

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

MLRA notes

Major Land Resource Area (MLRA): 027X–Fallon-Lovelock Area

Physiography Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years. The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters). Geology Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA. Climate The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation. Water The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout. Soils The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly a mesic temperature regime, aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum. Biological Resources This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey's greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

Ecological site concept

The Gravelly Claypan 8-10 P.Z. site occurs on sideslopes of mountains and hills on all exposures. At lower elevations this site is restricted to northerly aspects. Slope gradients are typically 15 to 50 percent, but can be up to 75 percent. Elevations are 4100 to 7000 feet. The soils are typically very shallow to moderately deep and well drained. There are high amounts of gravel or cobbles on the soil surface.

Associated sites

R027XY008NV	DROUGHTY LOAM 8-10 P.Z. Found on soils that have lower water holding capacity and create droughtier conditions.
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Similar sites

R027XY049NV	COBBLY CLAYPAN 8-10 P.Z. ARAR8 dominant shrub
R027XY065NV	GRANITIC SLOPE 8-10 P.Z. More productive site; ACSP12 dominant plant
R027XY087NV	CLAYPAN 14+ P.Z. ARAR8 dominant shrub
R027XY020NV	SHALLOW CLAYPAN 8-10 P.Z. ACSP12 dominant grass
R027XY070NV	DROUGHTY CLAYPAN 8-10 P.Z. Less productive site; ACHY-ACSP12 codominant; SAVEB major shrub
R027XY061NV	SHALLOW CALCAREOUS SLOPE 8-10 P.Z. ARNO4 dominant shrub
R027XY083NV	MOUNTAIN RIDGE ARAR8 dominant shrub
R027XY046NV	COBBLY CLAYPAN 12-14 P.Z. ARAR8 dominant shrub
R027XY032NV	SHALLOW CALCAREOUS LOAM 10-12 P.Z. ARNO4 dominant shrub

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia arbuscula ssp. longiloba</i>

Herbaceous	(1) <i>Achnatherum thurberianum</i>
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Physiographic features

The Gravelly Claypan 8-10 P.Z. site occurs on sideslopes of mountains and hills on all exposures. At lower elevations this site is restricted to northerly aspects. Slope gradients range from 2 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4100 to 7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Hill
Runoff class	High to very high
Elevation	1,250 – 2,130 m
Slope	0 – 80 %
Water table depth	180 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is cool, semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 8 to about 10 inches. Mean annual air temperature is 45 to 54 degrees F. The average growing season is about 90 to 120 days. There is no climate station available for this site.

Table 3 Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	250 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are typically very shallow to moderately deep and well drained. The soils typically have an argillic horizon and a mollic epipedon. There are high amounts of gravel or cobbles on the soil surface. The available water holding capacity is very low to moderate. Permeability is very slow to moderate. Potential for sheet and rill erosion is moderate to severe depending on slope. The soil moisture regime is aridic bordering on xeric and the soil temperature regime is mesic. The soil series associated with this

site include: Arclay, Bedzee, Boomstick, Ceejay, Coppereid, Loomer, Majuba, Nodur, Olac, Phing, and Pickup.

A representative soil series is Arclay, a loamy, mixed, superactive, mesic, shallow Aridic Argixerolls. A mollic epipedon occurs from the soil surface to 28 cm and an argillic horizon occurs from 13 to 42 cm.

Table 4. Representative soil features

Parent material	(1) Colluvium – granite
Surface texture	(1) Very gravelly loam (2) Very stony loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to moderate
Soil depth	10 – 100 cm
Surface fragment cover ≤3"	20 – 50 %
Surface fragment cover >3"	0 – 40 %
Available water capacity (0-101.6cm)	2.03 – 7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.2 – 7.6

Subsurface fragment volume <=3" (Depth not specified)	10 – 60 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

As ecological condition deteriorates, littleleaf horsebrush, Douglas' rabbitbrush and Lahontan sagebrush increase in the plant community as deep-rooted perennial herbaceous plants decrease. Species likely to invade these site are cheatgrass and annual forbs such as filaree.

Fire Ecology:

The mean fire return intervals for Lahontan sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Lahontan sagebrush is very susceptible to fire damage. Lahontan 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 Lahontan sagebrush may re-grow from living branches, but sprouting does not 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. Burning has been found to decrease the vegetation and reproductive vigor. Early season burning is more damaging to this needlegrass than late season burning.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			352-463	
	Thurber's needlegrass	ACTH7	<i>Achnatherum thurberianum</i>	336-404	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	8-39	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	8-20	–
2	Secondary Perennial Grasses			8-31	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	2-12	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	2-12	–
	Hooker's balsamroot	BAHO	<i>Balsamorhiza hookeri</i>	2-12	–
	buckwheat	ERIOG	<i>Eriogonum</i>	2-12	–
	desertparsley	LOMAT	<i>Lomatium</i>	2-12	–
	phlox	PHLOX	<i>Phlox</i>	2-12	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	2-12	–
Forb					
3	Perennial Forbs			8-39	
	little sagebrush	ARARL3	<i>Artemisia arbuscula ssp. longicaulis</i>	118-138	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	2-12	–
	Hooker's balsamroot	BAHO	<i>Balsamorhiza hookeri</i>	2-12	–
	buckwheat	ERIOG	<i>Eriogonum</i>	2-12	–
	desertparsley	LOMAT	<i>Lomatium</i>	2-12	–

	phlox	PHLOX	<i>Phlox</i>	2-12	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	2-12	–
Shrub/Vine					
4	Primary Shrubs			126-180	
	little sagebrush	ARARL3	<i>Artemisia arbuscula ssp. longicaulis</i>	118-138	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	8-43	–
5	Secondary Shrubs			20-59	
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	2-12	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	2-12	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	2-12	–
	bud sagebrush	PIDE4	<i>Picrothamnus desertorum</i>	2-12	–
	littleleaf horsebrush	TEGL	<i>Tetradymia glabrata</i>	2-12	–

Animal community

Livestock Interpretations: This site is suited for livestock grazing. Grazing management should be keyed to perennial grass and palatable shrub production. 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. Lahontan 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. 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:** Lahontan 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 Lahontan sagebrush, particularly in winter and early spring. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Open Wyoming sagebrush communities are preferred nesting habitat. 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. Leks are often located on low sagebrush sites, grassy openings, dry meadows, ridgetops, and disturbed sites. Thurber needlegrass is valuable forage for wildlife.

Hydrological functions

Runoff is high to very high. Permeability is very slow to moderate.

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

Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour.

Other information

Spiny hopsage has moderate potential for erosion control and low to high potential for long-term revegetation projects. It can improve forage, control wind erosion, and increase soil stability on gentle to moderate slopes. Spiny hopsage is suitable for highway plantings on dry sites in Nevada.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T24N R25E S20
General legal description	Southwest Sage Hen Valley area, toeslopes of Truckee Range, Churchill County, Nevada. This site also occurs in Lyon, Pershing, Storey and Washoe Counties, Nevada.

Other references

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

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

Contributors

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Approval

Kendra Moseley, 6/03/2024

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	07/18/2013
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 rills can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few (short <1 m and stable) can be expected 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.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare Ground $\pm$ 50% depending on amount of surface rock fragments

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

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 (< 10 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall 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.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically moderate thin platy. Soil surface colors are dark and soils are typified by a mollic epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted bunchgrasses (desert needlegrass) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch on site.

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. Subsoil argillic horizons are not to be interpreted as compacted.

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

Dominant: Deep-rooted, cool season, perennial bunchgrasses

Sub-dominant: low shrubs (Lahontan sagebrush) > associated shrubs > deep-rooted, cool season, perennial forbs = shallow-rooted, cool season, perennial bunchgrasses > fibrous, shallow-rooted, cool season, perennial and annual forbs.

Other:

Additional: After wildfire: perennial bunchgrasses and sprouting shrubs dominate for the first 10 to 20 years.

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 30% of total woody canopy; some of the mature bunchgrasses (<30%) have dead centers.
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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces ($\pm 25\%$) and litter depth is $< \frac{1}{4}$ 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 June) ± 300 lbs/ac; Favorable years ± 500 lbs/ac and unfavorable years ± 200 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 on this site include cheatgrass, medusa head, annual mustards and Russian thistle.
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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 occur during extreme or extended drought conditions.
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