USDA Natural Resources Conservation Service

Ecological site R027XY014NV
COARSE SILTY 4-8 P.Z.

Last updated: 6/03/2024
Accessed: 06/30/2024

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 Coarse Silty 4-8 P.Z. site occurs on inset fans, alluvial flats, and fan skirts on all exposures. Slopes are less than 4 percent. Elevations are 4000 to 6700 feet. The soils are typically very deep and are well drained. Surface soils are typically moderately coarse to coarse textured.

Associated sites

R027XY013NV	**LOAMY 4-8 P.Z.** ATCO-PIDE4 codominant shrubs; KRLA2 not dominant

Similar sites

R029XY042NV	**COARSE SILTY 5-8 P.Z.** PLJA important grass; LYCIU often present
R024XY004NV	**SILTY 4-8 P.Z.** KRLA2 dominant plant; less productive site; less shrub diversity
R029XY020NV	**SILTY 5-8 P.Z.** KRLA2 dominant plant; less productive site; less shrub diversity

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Krascheninnikovia lanata*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

The Coarse Silty 4-8 P.Z. site occurs on inset fans, alluvial flats, and fan skirts on all exposures. Slopes range from 0 to 4 percent. Elevations are 4000 to 6700 feet.

Table 2. Representative physiographic features

Landforms	(1) Inset fan (2) Alluvial flat (3) Fan skirt
Runoff class	Very low to medium
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	Rare to occasional

Ponding frequency	None
Elevation	4,000–6,700 ft
Slope	0–4%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is arid, characterized by cool, moist winters, and hot, dry summers. Average annual precipitation is 4 to 8 inches. Mean annual air temperature is 45 to 55 degrees F. The average growing season is about 90 to 140 days.

Table 3. Representative climatic features

Frost-free period (average)	140 days
Freeze-free period (average)	
Precipitation total (average)	8 in

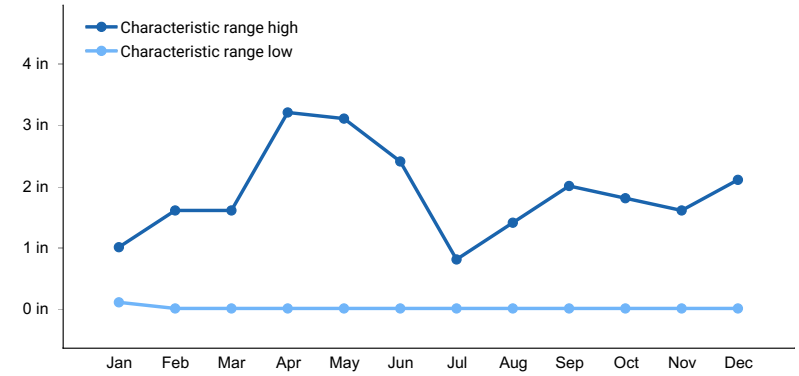


Figure 1. Monthly precipitation range

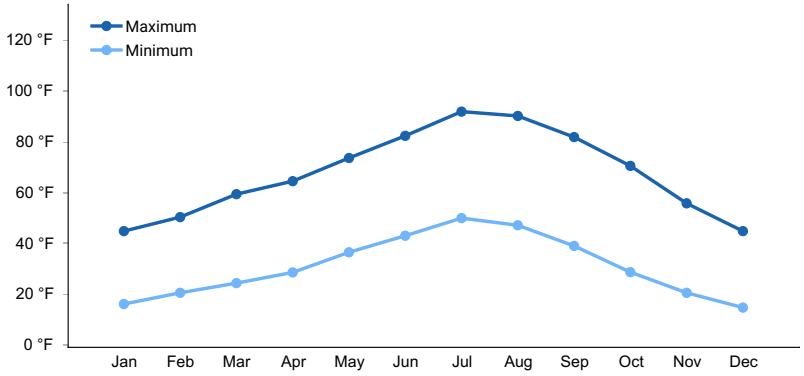


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are typically very deep and are well drained. Surface soils are typically moderately coarse to coarse textured. These soils have moderate to moderately rapid permeability and very low to medium runoff. The soils are moderately to strongly alkaline and calcareous throughout the profile. The coarse surface textures provide rapid water infiltration and enhance the effective moisture supply. Available water capacity

is very low to moderate. Sheet and rill erosion potential is slight. The soil series associated with this site include: Bylo Variant, Defler, Juva, and Kumiva.

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Gravelly fine sandy loam (2) Silt loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	72–84 in
Surface fragment cover <=3"	2–42%
Surface fragment cover >3"	2–3%
Available water capacity (0-40in)	2.9–7 in
Calcium carbonate equivalent (0-40in)	0–25%
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–30
Soil reaction (1:1 water) (0-40in)	7.4–9.6
Subsurface fragment volume <=3" (Depth not specified)	2–43%
Subsurface fragment volume >3" (Depth not specified)	2–3%

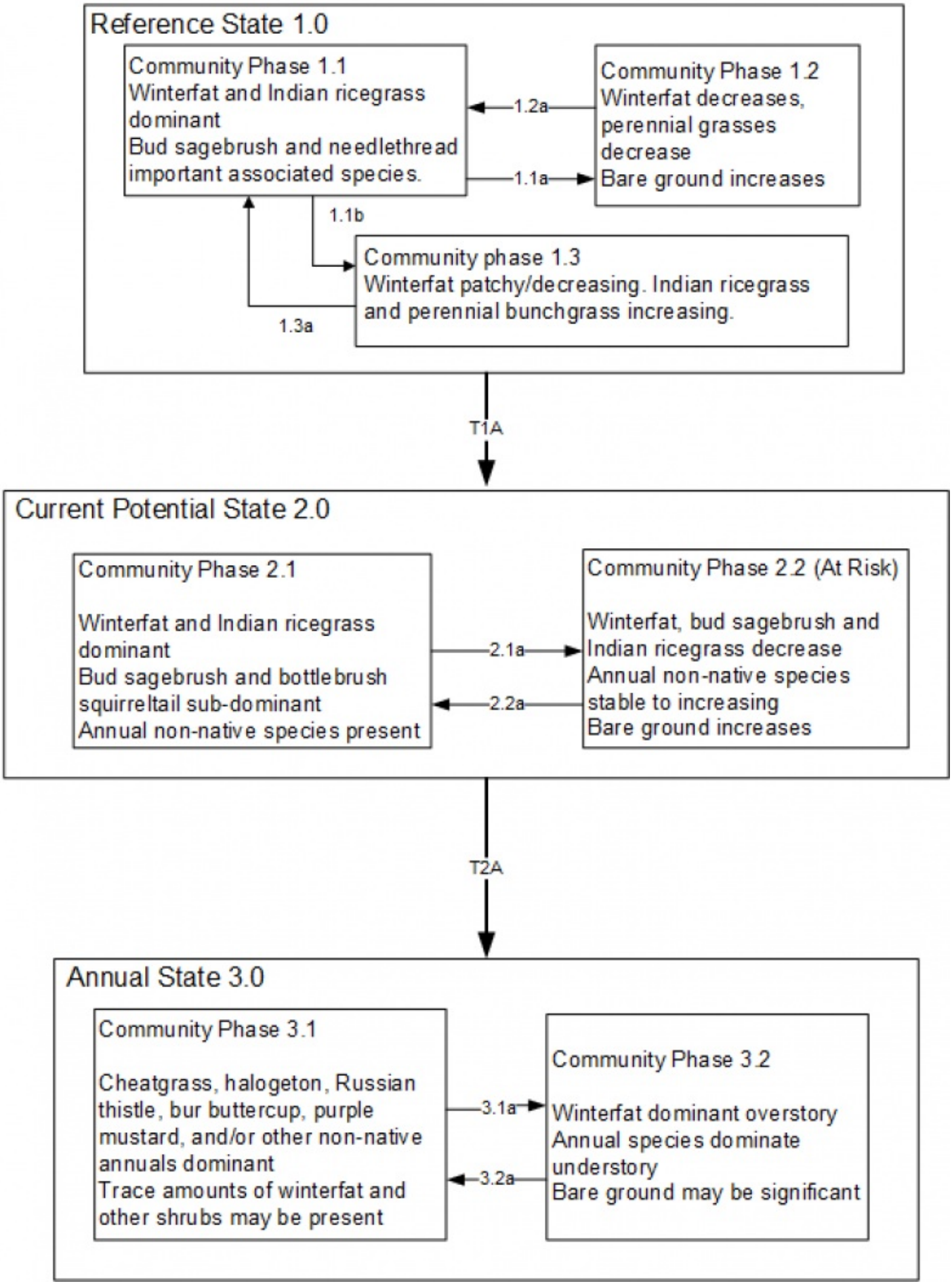
Ecological dynamics

Management which results in abusive grazing use by livestock or wild horses will encourage an increase of Douglas' rabbitbrush, shadscale, bottlebrush squirreltail and Sandberg's bluegrass as Indian ricegrass and winterfat decrease. Species most likely to invade this site are annuals such as cheatgrass, mustards, and Russian thistle.

Fire Ecology:
Prior to the invasion of exotic annuals, fire was an uncommon component of salt-desert shrub communities. Salt-desert communities dominated by winterfat produced little fine fuel. The introduction of annual grasses, including the highly flammable cheatgrass (*Bromus tectorum*), into these communities has altered fuel loads and fuel distribution. After wet years when annual grass production is high, salt-desert shrub communities are susceptible to fire. Fire drastically alters the community composition because salt-desert shrubs are not adapted to periodic fire. Winterfat is either killed or top-killed by fire, depending on fire severity. Severe fire can kill the perennating buds located several inches above the ground surface and thus kills the plant. In addition, severe fire usually destroys seed on the plant. Low-severity fire scorches or only partially consumes the aboveground portions of winterfat and thus does not cause high mortality.
Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas.

State and transition model

027XY014NV – Coarse Silty 4-8"



Reference State 1.0 Community Phase Pathways

Reference State 1.0 Community Phase Pathways

The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. This state has two community phases, one co-dominated by shrubs and grass, and the other dominated by shrubs. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. This site is very stable, with little variation in plant community composition. Plant community changes would be reflected in production in response to drought or inappropriate grazing management. Wet years will increase grass production, while drought years will reduce production. Shrub production will also increase during wet years; however, recruitment of winterfat is episodic.

Community Phase 1.1
This community is dominated by winterfat and Indian ricegrass. Needleandthread, bottlebrush squirreltail and bud sagebrush are also important species on this site. Community phase changes are primarily a function of chronic drought. Fire is infrequent and patchy due to low fuel loads.
CPP 1.1a: Drought and/or excessive herbivory during the growing season will reduce both shrub and perennial bunchgrass production.
CPP 1.1b: low intensity/patchy fire

Community Phase 1.2:
Drought will favor shrubs over perennial bunchgrasses. However, long-term drought will result in an overall decline in the plant community, regardless of functional group.
CPP 1.2a: Time, lack of disturbance and release from drought will allow for the perennial grasses to increase, especially with an increase in spring precipitation.

Community Phase 1.3:
This community phase is characteristic of post disturbance plant community. Winterfat is patchy and temporarily reduced. Indian ricegrass and perennial bunchgrass increasing. Under natural conditions fires are low severity and patchy.
CPP 1.3a: absence of disturbance and natural regeneration over time

Transition T1A: Introduction of non-native annual species such as cheatgrass, halogeton and mustards.
Trigger: This transition is caused by the introduction of non-native annual plants, such as halogeton and cheatgrass.
Slow variables: Over time the annual non-native species will increase within the community.
Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Current Potential State 2.0 is similar to the Reference State 1.0. This state has the same two general community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community Phase 2.1:
This community is dominated by winterfat and Indian ricegrass. Bottlebrush squirreltail and bud sagebrush are also important species on this site. Community phase changes are primarily a

function of chronic drought. Fire is infrequent and patchy due to low fuel loads. Non-native annual species are present.
CPP 2.1a: Drought and/or inappropriate grazing management

Community Phase 2.2: This community is dominated by winterfat. The perennial grass component is significantly reduced
CPP 2.2a: Release from drought combined with appropriate grazing management would allow for both the shrubs and perennial grasses to recover.

Transition T2A:
Trigger: Severe fire/ multiple fires, long term inappropriate grazing management, and/or soil disturbing treatments such as plowing.
Slow variables: Increased production and cover of non-native annual species.
Threshold: Increased, continuous fine fuels modify the fire regime by changing intensity, size and spatial variability of fires. Changes in plant community composition and spatial variability of vegetation due to the loss of perennial bunchgrasses and sagebrush truncate energy capture spatially and temporally thus impacting nutrient cycling and distribution.

Annual State 3.0: This state consists of two community phases. This state is characterized by the dominance of annual non-native species such as halogeton and cheatgrass. Rabbitbrush, shadscale, sickle saltbush and other sprouting shrubs may dominate the overstory.

Community Phase 3.1:
This community is dominated by annual non-native species. Trace amounts of winterfat and other shrubs may be present, but are not contributing to site function. Bare ground may be abundant, especially during low precipitation years. Soil erosion, soil temperature and wind are driving factors in site function.
CPP 3.1a: Reestablishment of winterfat. This pathway is unlikely due to the impact of annual non-native species on the establishment and growth of winterfat seedlings.
Community Phase 3.2:
This community is dominated by winterfat with an understory of non-native annual species. Perennial bunchgrasses may be a minor component or missing. Bare ground may be abundant.

CPP 4.2a: Fire

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by Indian ricegrass and winterfat. Potential vegetative composition is about 55% grasses, 5% forbs and 40% shrubs. Approximate ground cover (basal and crown) is 10 to 20 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	385	275	192
Shrub/Vine	280	200	140
Forb	35	25	18
Total	**700**	**500**	**350**

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**			230–365	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	200–250	–
	needle and thread	HECO26	*Hesperostipa comata*	20–75	–
	squirreltail	ELEL5	*Elymus elymoides*	10–40	–
2	**Secondary Perennial Grasses**			10–40	
	James' galleta	PLJA	*Pleuraphis jamesii*	3–10	–
	Sandberg bluegrass	POSE	*Poa secunda*	3–10	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	3–10	–
Forb					
3	**Perennial Forbs**			10–40	
	globemallow	SPHAE	*Sphaeralcea*	3–10	–
Shrub/Vine					
4	**Primary Shrubs**			150–275	
	winterfat	KRLA2	*Krascheninnikovia lanata*	125–200	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	25–75	–
5	**Secondary Shrubs**			25–75	
	fourwing saltbush	ATCA2	*Atriplex canescens*	3–15	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	3–15	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	3–15	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	3–15	–
	spiny hopsage	GRSP	*Grayia spinosa*	3–15	–
	Nevada dalea	PSPO	*Psorothamnus polydenius*	3–15	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	3–15	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management should be keyed to indian ricegrass and winterfat. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It supplies a source of green feed before most other native grasses have produced much new growth.
Needleandthread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain.
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.
Winterfat is an important forage plant for livestock, especially during winter when forage is scarce. Abusive grazing practices have reduced or eliminated winterfat on some areas even though it is fairly resistant to browsing. Effects depend on severity and season of grazing.
Budsage is palatable and nutritious forage for domestic sheep in the winter and spring although it is known to cause mouth sores in lambs. Budsage can be poisonous or fatal to calves when eaten in quantity. Budsage, while desired by cattle in spring, is poisonous to cattle when consumed alone.

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:
Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground.
Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available.
Bottlebrush squirreltail is a dietary component of several wildlife species.
Winterfat is an important forage plant for wildlife, especially during winter when forage is scarce. Winterfat seeds are eaten by rodents and are a staple food for black-tailed jackrabbits. Mule deer and pronghorn antelope browse winterfat. Winterfat is used for cover by rodents. It is potential nesting cover for upland game birds, especially when grasses grow up through its crown.
Budsage is palatable, nutritious forage for upland game birds, small game and big game in winter. Budsage is rated as "regularly, frequently, or moderately taken" by mule deer in Nevada in winter and is utilized by bighorn sheep in summer, but the importance of budsage in the diet of bighorns is not known. Bud sage comprises 18 – 35% of a pronghorn’s diet during the spring where it is available. Chukar will utilize the leaves and seeds of bud sage. Budsage is highly susceptible to effects of browsing. It decreases under browsing due to year-long palatability of its buds and is particularly susceptible to browsing in the spring when it is physiologically most active.

Hydrological functions

Runoff is very low to medium. Permeability is moderate to moderately rapid.

Other products

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source.

Other information

Needleandthread is useful for stabilizing eroded or degraded sites.
Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.
Winterfat adapts well to most site conditions, and its extensive root system stabilizes soil. However, winterfat is intolerant of flooding, excess water, and acidic soils.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Mineral County, NV	
Township/Range/Section	T14N R35E S20
General legal description	About 13 miles northwest of Gabbs, Grass Valley area, Mineral County, Nevada. This site also occurs in Churchill, Lyon and Pershing 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

DK/GD

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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	07/12/2012
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** Water flow patterns are rare to common depending on site location relative to major inflow areas.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground ± 60%

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 of grasses and annual & perennial forbs) expected to move distance of slope length during periods of intense summer convection storms or run in of early spring snow melt flows. Persistent litter (large woody material) will remain in place except during unusual flooding (ponding) 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 will range from 1 to 4. (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):** Structure of soil surface is thin to medium platy. Soil surface colors are light grays or pale browns and soils are typified by an ochric epipedon. Organic matter is typically < 1 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shrubs and deep-rooted perennial herbaceous bunchgrasses aid in 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 subsurface layers are normal for this site and are not to be interpreted as compaction.

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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: deep-rooted, cool season, perennial bunchgrasses > salt-desert shrubs (winterfat & budsage)

    Sub-dominant: shallow-rooted cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forbs = fibrous, shallow-rooted, cool season, perennial and annual forbs >warm season rhizomatous perennial grasses =shallow-rooted, warm season perennial bunchgrasses

    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 30% of total woody canopy.

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14. **Average percent litter cover (%) and depth (in):** Under canopy and between plant interspaces (10-20%) and depth (± ¼ in.).

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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 (March thru May) ± 500 lbs/ac. Favorable years ± 700 lbs/ac; unfavorable years ± 350 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, annual mustards, annual kochia, Russian thistle, and halogeton.

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