USDA Natural Resources
Conservation Service

Ecological site R023XY059NV
GRAVELLY CLAYPAN 10-12 P.Z.

Last updated: 4/10/2025
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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 Clay or Claypan ,12” PZ Low and Lahontan sagebrush and bluebunch wheatgrass/ Thurber’s needlegrass 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/R023XY901NV

The dominant grasses on this site are Thurber’s and Webber’s needlegrass. Like the modal site, Low sagebrush is the dominant shrub and spiny hopsage (Grayia spinosa) is a subdominant shrub. It is less productive than the modal site with 450 lbs/ac in a normal year. This site is found on convex summits and backslopes of low hills and erosional fan remnants, from 5000 to 6000 feet. The soils on this site have formed in alluvium or residuum derived from volcanic rock sources. These soils are generally shallow or moderately deep. There is a moderate to strong-structured, clay subsoil ranging from 8 to 12 inches in the soil profile. The soils have high amounts of gravel and/or small cobbles (over 65 percent ground cover) on the surface which provide a stabilizing effect on surface erosion conditions. This site has a four state model; it is unlikely to get a tree state or an eroded state. This site has been seen in a shrub state with no non-native annuals, indicating that it can transition from Reference to the Shrub State, Transition T1B: Long-term inappropriate grazing management favors shrubs and the shallow-rooted Sandberg bluegrass.

Associated sites

R023XY006NV	**LOAMY 8-10 P.Z.**
R023XY020NV	**LOAMY 10-12 P.Z.**

Similar sites

R023XY017NV	**CLAYPAN 14-16 P.Z.** PSSPS-FEID codominant; higher elevations; more productive site
R023XY044NV	**VERY COBBLY CLAYPAN** POSE dominant grass; soils are vertisols
R023XY079NV	**ASHY CLAYPAN (COOL) 10-14 P.Z.** FEID-ACTH7 codominant; more productive site
R023XY021NV	**SCABLAND 10-14 P.Z.** POSE dominant grass; less productive site
R023XY014NV	**SHALLOW LOAM 14+ P.Z.** FEID dominant grass; higher elevations; more productive site
R023XY031NV	**CLAYPAN 10-14 P.Z.** PSSPS-ACTH7 codominant
R023XY078NV	**ASHY CLAYPAN 10-14 P.Z.** PSSPS-ACTH7 codominant; more productive site
R023XY060NV	**COBBLY CLAYPAN 8-12 P.Z.** PSSPS-ACTH7 codominant; less productive site
R023XY008NV	**MOUNTAIN RIDGE** FEID dominant grass; higher elevations; different landform; less productive site

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia arbuscula*
Herbaceous	(1) *Achnatherum thurberianum*

Physiographic features

This site occurs on convex summits and backslopes of plateaus, fan remnants, and fan skirts. Slopes range from 0 to 15 percent, but slope gradients of 2 to 8 percent are typical. Elevations are 4500 to about 6300 feet.

Table 2. Representative physiographic features

Landforms	(1) Plateau (2) Fan remnant (3) Fan skirt
Elevation	4,500–6,300 ft
Slope	0–15%

Aspect	Aspect is not a significant factor

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 12 inches. Mean annual air temperature is 41 to 52 degrees F. The average growing season is about 70 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 precipitaion 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)	90 days
Freeze-free period (average)	
Precipitation total (average)	11 in

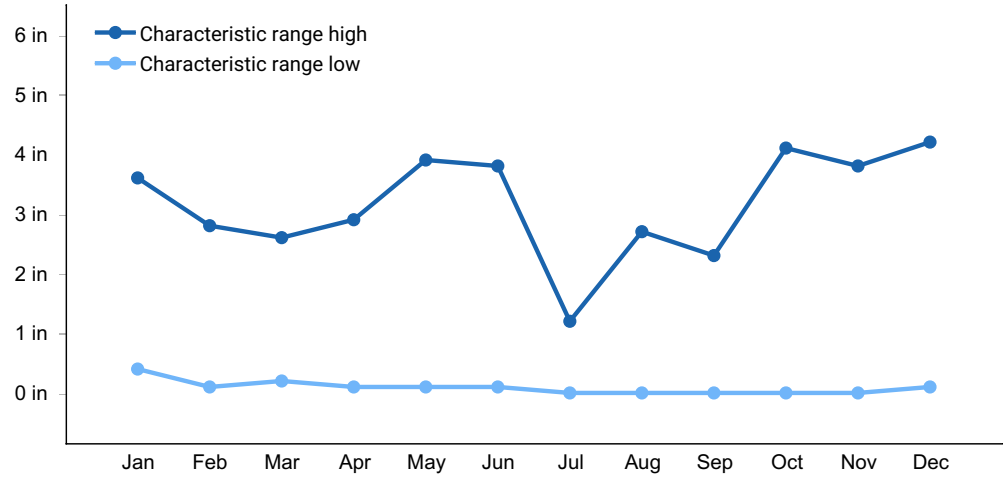


Figure 1. Monthly precipitation range

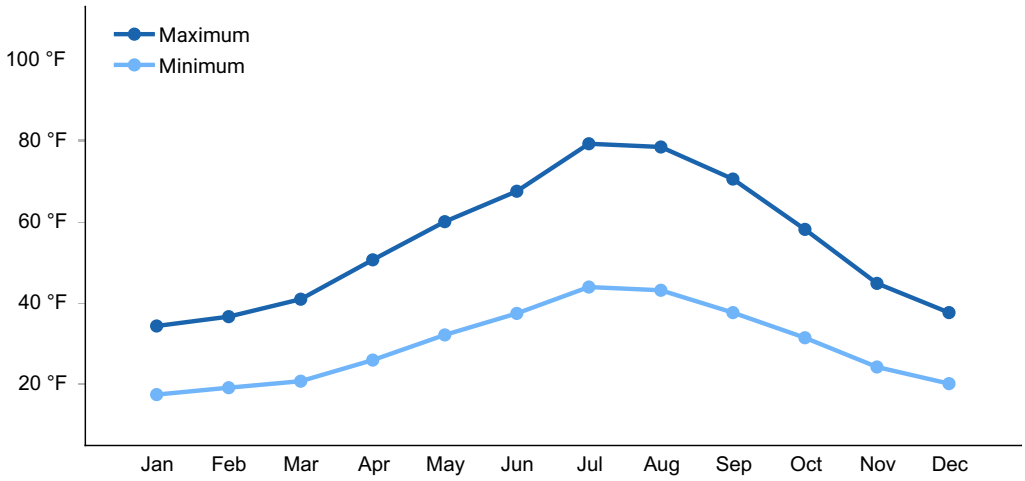


Figure 2. Monthly average minimum and maximum temperature

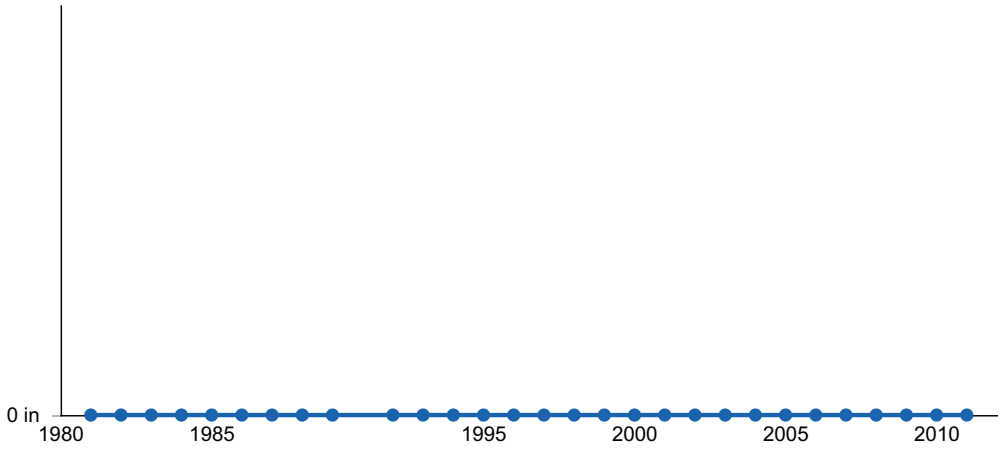


Figure 3. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils assocaited with this site have formed in alluvium or residuum derived from volcanic rock sources. These soils are generally shallow or moderately deep with depth to a moderate to strong-structured, clay subsoil ranging from 8 to 12 inches. There is an abrupt textural change between the surface soil and subsoil. Permeability is moderately slow or very slow and the soils are well-drained. Available water holding capacity is low. Infiltration of water is restricted once these soils are wetted. The soils have high amounts of gravel and/or small cobbles (over 65 percent ground cover) on the surface which provide a stabilizing affect on surface erosion conditions. The soil series associated with this site include: Esmod, Ferver, Grassycan, and Indian Creek.

Table 4. Representative soil features

Surface texture	(1) Very cobbly loam (2) Cobbly sandy loam (3) Very cobbly silt loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	4–60 in
Surface fragment cover <=3"	19–50%
Surface fragment cover >3"	2–27%
Available water capacity (0-40in)	1.6–5.6 in

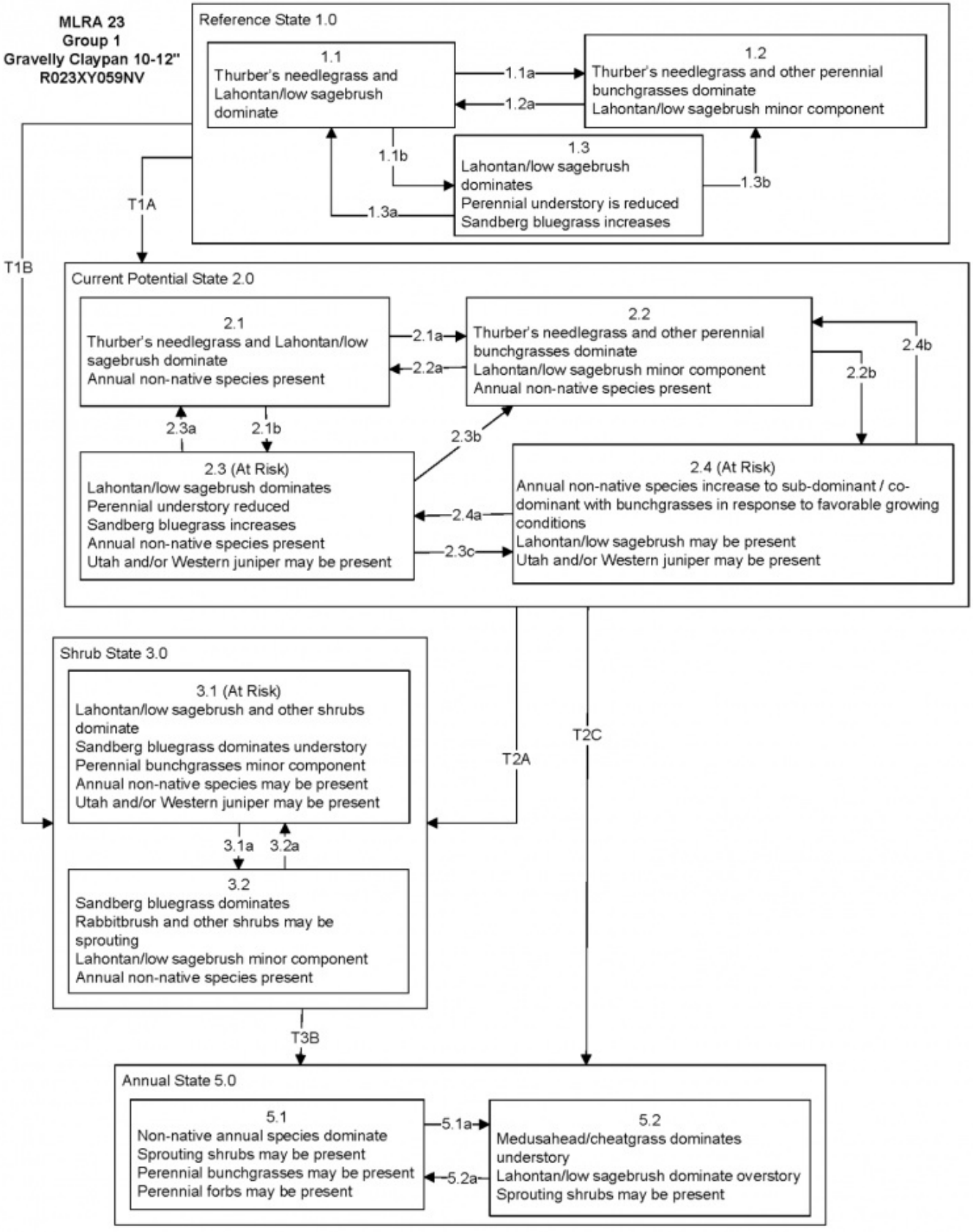
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	6.1–9
Subsurface fragment volume <=3" (Depth not specified)	5–50%
Subsurface fragment volume >3" (Depth not specified)	0–30%

Ecological dynamics

Low sagebrush, Douglas rabbitbrush and Sandberg's bluegrass increase while Thurber's needlegrass and other desirable forage grasses decrease with excessive use by livestock.

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. 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. Webber's needlegrass is damaged by burning due to dense plant material that can burn slowly and long, charring to the growing points. Late summer and early fall fires are the least harmful. 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. Burning bluebunch wheatgrass may remove most of the aboveground biomass but does not usually result in plant mortality. Bluebunch wheatgrass is generally favored by burning. Burning stimulates flowering and seed production. However, season of burning affects mortality.

State and transition model


MLRA 23
Group 1
Gravelly Claypan 10-12"
R023XY059NV
Reference State 1.0
1.1
Thurber's needlegrass and Lahontan/low sagebrush dominate
1.1a
1.2a
1.2
Thurber's needlegrass and other perennial bunchgrasses dominate
Lahontan/low sagebrush minor component
1.1b
1.3a
1.3
Lahontan/low sagebrush dominates
Perennial understory is reduced
Sandberg bluegrass increases
1.3b
T1A
T1B
Current Potential State 2.0
2.1
Thurber's needlegrass and Lahontan/low sagebrush dominate
Annual non-native species present
2.1a
2.2a
2.2
Thurber's needlegrass and other perennial bunchgrasses dominate
Lahontan/low sagebrush minor component
Annual non-native species present
2.4b
2.2b
2.3a
2.1b
2.3b
2.3 (At Risk)
Lahontan/low sagebrush dominates
Perennial understory reduced
Sandberg bluegrass increases
Annual non-native species present
Utah and/or Western juniper may be present
2.4a
2.3c
2.4 (At Risk)
Annual non-native species increase to sub-dominant / co-dominant with bunchgrasses in response to favorable growing conditions
Lahontan/low sagebrush may be present
Utah and/or Western juniper may be present
T2A
T2C
Shrub State 3.0
3.1 (At Risk)
Lahontan/low sagebrush and other shrubs dominate
Sandberg bluegrass dominates understory
Perennial bunchgrasses minor component
Annual non-native species may be present
Utah and/or Western juniper may be present
3.1a
3.2a
3.2
Sandberg bluegrass dominates
Rabbitbrush and other shrubs may be sprouting
Lahontan/low sagebrush minor component
Annual non-native species present
T3B
Annual State 5.0
5.1
Non-native annual species dominate
Sprouting shrubs may be present
Perennial bunchgrasses may be present
Perennial forbs may be present
5.1a
5.2a
5.2
Medusahead/cheatgrass dominates understory
Lahontan/low sagebrush dominate overstory
Sprouting shrubs may be present

MLRA 23
Group 1
Gravelly Claypan 10-12"
R023XY059NV
KEY

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush and leads to early/mid-seral community, dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire. Excessive herbivory may also reduce perennial understory.
1.2a: Time and lack of disturbance allows for shrub reestablishment.
1.3a: Low severity fire, herbivory or combinations reduces sagebrush.
1.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community, dominated by grasses and forbs.

Transition T1A: Introduction of non-native annual species.
Transition T1B: Long-term inappropriate grazing management favors shrubs and Sandberg bluegrass.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush 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 as fire. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for shrub reestablishment.
2.2b: Fall and spring growing conditions that favors the germination and production of non-native, annual grasses. Pathway typically occurs 3 to 5 years post-fire and 2.4 may be a transitory plant community.
2.3a: Low severity fire creates sagebrush/ grass mosaic, herbivory, or combination or brush management with minimal soil disturbance.
2.3b: High severity fire significantly reduces sagebrush and leads to early/mid-seral community or brush management with minimal soil disturbance reduces sagebrush.
2.3c: Fall and spring growing season conditions that favors the germination and production of non-native annual grasses. 2.4 may be a transitory plant community.
2.4a: Growing season conditions favoring perennial bunchgrass production and reduced cheatgrass production.
2.4b: Growing season conditions favoring perennial bunchgrass production and reduced cheatgrass production.

Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (to 3.1). Brush management of Community Phase 2.3 may result in Community Phase 3.2.
Transition T2C: Severe fire and/or multiple fires.

Shrub State 3.0 Community Phase Pathways
3.1a: High severity fire; brush management with minimal soil disturbance.
3.2a: Time and lack of disturbance (unlikely/may take many years).

Transition T3B: Invasive annual grasses increase under shrubs, or, high-severity fire or multiple fires and/or treatments that disturb the soil surface in the presence of non-native annual grasses. (to 5.1).

Annual State 5.0 Community Phase Pathways
5.1a: Time and lack of disturbance.
5.2a: Fire.

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by low sagebrush and Thurber's needlegrass. Potential vegetative composition is about 55% grasses, 10% forbs and 35% shrubs. Approximate ground cover (basal and crown) is about 20 to 30 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	165	248	330
Shrub/Vine	105	158	210
Forb	30	45	60
Total	**300**	**451**	**600**

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**			233–374	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	180–225	–
	Webber needlegrass	ACWE3	*Achnatherum webberi*	22–68	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	9–36	–
	Sandberg bluegrass	POSE	*Poa secunda*	11–22	–
2	**Secondary Perennial Grasses**			9–36	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–9	–
	squirreltail	ELEL5	*Elymus elymoides*	2–9	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	2–9	–
Forb					
3	**Perennial**			22–68	
	aster	ASTER	*Aster*	2–9	–
	milkvetch	ASTRA	*Astragalus*	2–9	–
	Hooker's balsamroot	BAHO	*Balsamorhiza hookeri*	2–9	–
	buckwheat	ERIOG	*Eriogonum*	2–9	–
	phlox	PHLOX	*Phlox*	2–9	–
Shrub/Vine					
4	**Primary Shrubs**			121–180	
	little sagebrush	ARAR8	*Artemisia arbuscula*	112–158	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	9–22	–
5	**Secondary Shrubs**			9–36	
	spiny hopsage	GRSP	*Grayia spinosa*	5–9	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management should be keyed to perennial grass 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. Webber's needlegrass is desired forage in the spring and undesired the rest of the year for livestock. Canby's and 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. Canby's and 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. Bluebunch wheatgrass is considered one of the most important forage grass species on western rangelands for livestock. Although bluebunch wheatgrass can be a crucial source of forage, it is not necessarily the most highly preferred species. 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. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities. 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. In parts of the Great Basin, plants regrew rapidly after they were nearly completely consumed by spring-browsing black-tailed jackrabbits. Thurber needlegrass is valuable forage for wildlife. Webber's needlegrass is desired forage in the spring and undesired the rest of the year for wildlife. Canby's and 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. 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

Runoff is medium to very high. Permeability is very slow to moderately slow. Hydrologic soil group is D. Rills ans pedestals are rare. A few rills can be expected on steeper slopes (over 15%) in areas subjected to summer convection storms or rapid spring snowmelt. Occurrences of pedestals is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered a "normal" condition. Water flow patterns are rare but can be expected in areas recently subjected to summer convection storms or rapid snowmelt, usually on steeper slopes (over 15%). Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies associated with ephemeral stream channel entrenchment may be present. If present, gullies and head cuts should be healing or stable. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Thurber's needlegrass]) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

Recreational uses

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

Type locality

Location 1: Washoe County, NV	
Township/Range/Section	T45N R21E S7
UTM zone	N
UTM northing	278477
UTM easting	4635009
Latitude	41° 50′ 9″
Longitude	119° 40′ 4″

General legal description	SE 1/4 NW 1/4, About ¼ mile north of entrance to Sheldon Refuge (Road 34A) on County Road 34, about 200 feet east of road, Washoe County, Nevada.

Location 2: Humboldt County, NV	
Township/Range/Section	T47N R24E S20
UTM zone	N
UTM northing	312622
UTM easting	4652062
Latitude	41° 59′ 53″
Longitude	119° 15′ 44″
General legal description	E 1/2, Approximately 2 miles south of Nevada Highway 140, Sage Hen Hills area, USF&WS Sheldon Antelope Range, Humboldt County, 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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T Stringham (UNR under contract with BLM)

Approval

Kendra Moseley, 4/10/2025

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	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:** Rills are rare. A few rills can be expected on steeper slopes (over 15%) in areas subjected to summer convection storms or rapid spring snowmelt.

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2. **Presence of water flow patterns:** Water flow patterns are rare but can be expected in areas recently subjected to summer convection storms or rapid snowmelt, usually on steeper slopes (over 15%).

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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 ± 40%; surface cover of rock fragments =65%; shrub canopy 20 to 25%; foliar cover of perennial herbaceous plants ± 40%.

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5. **Number of gullies and erosion associated with gullies:** Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies associated with ephemeral stream channel entrenchment may be present. If present, gullies and head cuts should be healing or stable.

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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) 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.

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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 3 to 6 on most soil textures found on this site. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically thin to thick 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 4 inches is typically less than 1.5 percent. Organic matter content can be more or less depending on micro-topography.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Thurber"""""s needlegrass]) 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 not typical. Platy or massive sub-surface horizons, subsoil argillic horizons or hardpans shallow to the surface are not to be interpreted as compacted.

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

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

    Sub-dominant: Shallow-rooted, cool season, perennial bunchgrasses = associated shrubs = fibrous, shallow-rooted, cool season, perennial and annual forbs. (By above ground

production)

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 are common and standing dead shrub canopy material may be as much as 25% of total woody canopy; mature bunchgrasses may have dead centers (<25%).

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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces (± 10%) and litter depth is ± ¼ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through mid-June) ± 450 lbs/ac; Spring moisture significantly affects total production.

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

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