USDA Natural Resources
Conservation Service

Ecological site R023XY096NV
ASHY SANDY LOAM 10-12 P.Z.

Last updated: 4/10/2025
Accessed: 01/16/2026

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 Ashy or Loamy Skeletal Mod Deep 10-20 PZ High-Resilience Mountain Big Sagebrush and Idaho Fescue 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/R023XY906NV

This site is less productive than the modal site with only 900 lbs/ac in normal years. Soils on this site have high amounts of vitric volcanic ash and glass throughout the soil profile which enhances water holding capacity. Soils are moderately coarse to medium textured allowing for rapid infiltration of water. This site can have a mix of Wyoming, basin, and mountain big sagebrush. Thurber's needlegrass is more dominant than Idaho fescue or bluebunch wheatgrass. This site is similar to the group modal site with 2 stable states.

Associated sites

R023XY020NV	**LOAMY 10-12 P.Z.**
R023XY031NV	**CLAYPAN 10-14 P.Z.**
R023XY071NV	**ASHY LOAM 10-12 P.Z.**
R023XY072NV	**ASHY SLOPE 10-12 P.Z.**

Similar sites

R023XY020NV	**LOAMY 10-12 P.Z.** FEID minor species

R023XY007NV	**LOAMY 14-16 P.Z.** FEID-PSSPS codominant; ARTRV dominant shrub
R023XY072NV	**ASHY SLOPE 10-12 P.Z.** FEID dominant grass
R023XY082NV	**LOAMY FAN 10-12 P.Z.** ACTH7-POA-LECI4 codominant grasses
R023XY071NV	**ASHY LOAM 10-12 P.Z.** FEID dominant grass
R023XY094NV	**ASHY SLOPE 12-14 P.Z.** ARTRV dominant shrub
R023XY066NV	**ASHY LOAM 14-16 P.Z.** ARTRV-PUTR2 codominant shrubs

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata*
Herbaceous	(1) *Achnatherum thurberianum* (2) *Pseudoroegneria spicata ssp. spicata*

Physiographic features

This site occurs on shoulders and backslopes of plateaus, piedmonts, and low hills on all aspects. Slopes range from 2 to 30 percent, but slope gradients of 4 to 15 percent are typical. Elevations are 5600 to 6400 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plateau (3) Mountain
Elevation	1,707–1,951 m
Slope	2–30%
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 14 inches. Mean annual air temperature is 44 to 47 degrees F. The average growing season is about 80 to 100 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)	305 mm

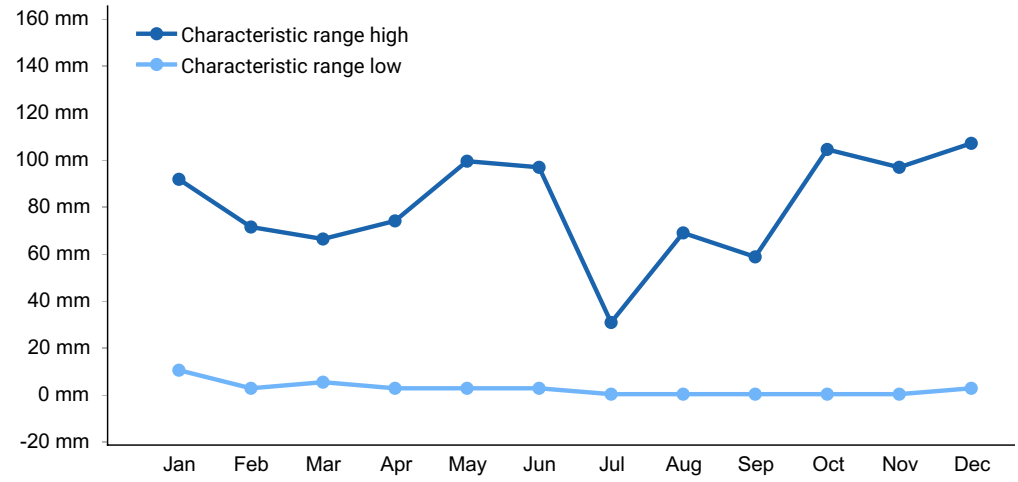


Figure 1. Monthly precipitation range

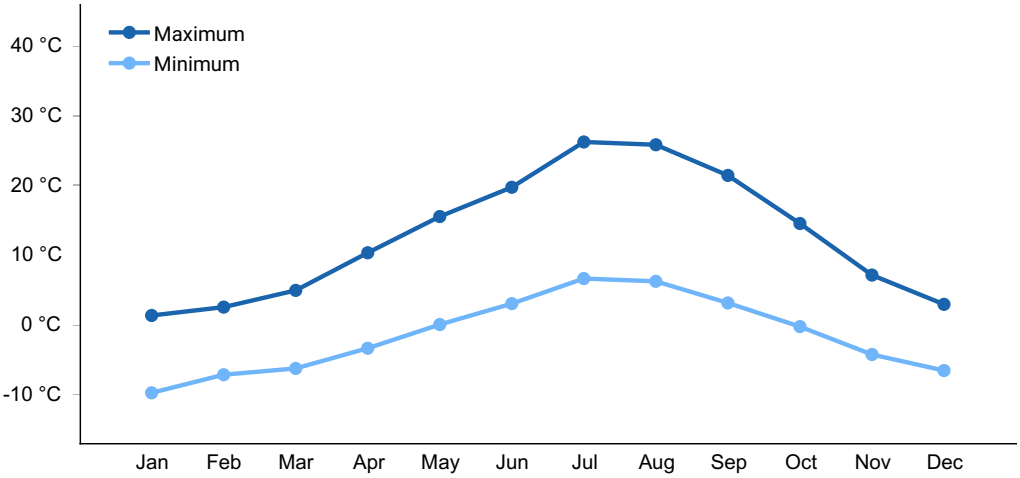


Figure 2. Monthly average minimum and maximum temperature

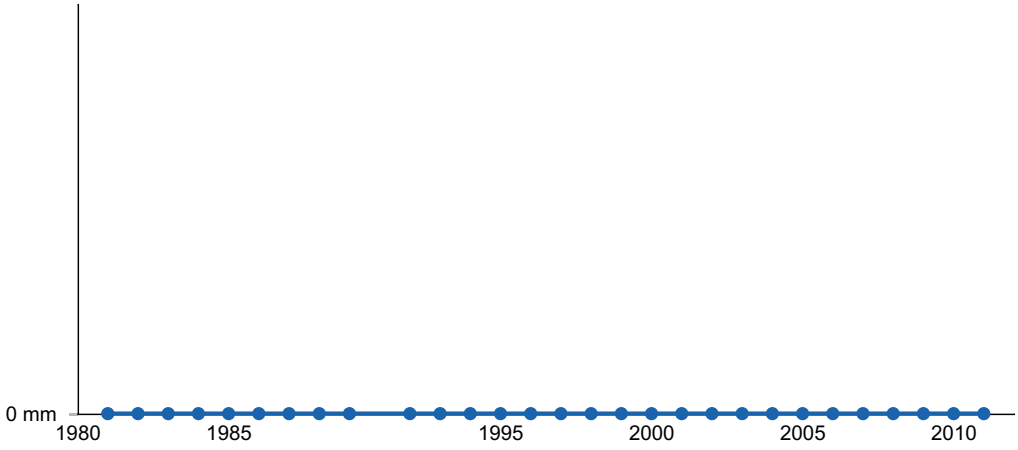


Figure 3. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are moderately deep to deep and well drained. The soils are formed in residuum and colluvium derived from pyroclastic and extrusive volcanic rocks. Surface soils are moderately coarse to medium textured and more than ten inches thick to the subsoil or underlying material. There are very high amounts of vitric volcanic ash and glass throughout the soil profile which enhances the water holding capacity of these soils. Available water holding capacity is low. Infiltration of water is rapid due to the relatively coarse textured surface soils. Permeability is moderately rapid and runoff is high. The soil series associated with this site include: Bitner.

Table 4. Representative soil features

Surface texture	(1) Gravelly sandy loam (2) Gravelly loamy sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	51–102 cm
Surface fragment cover <=3"	20–35%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	9.14–10.41 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	17–43%
Subsurface fragment volume >3" (Depth not specified)	0%

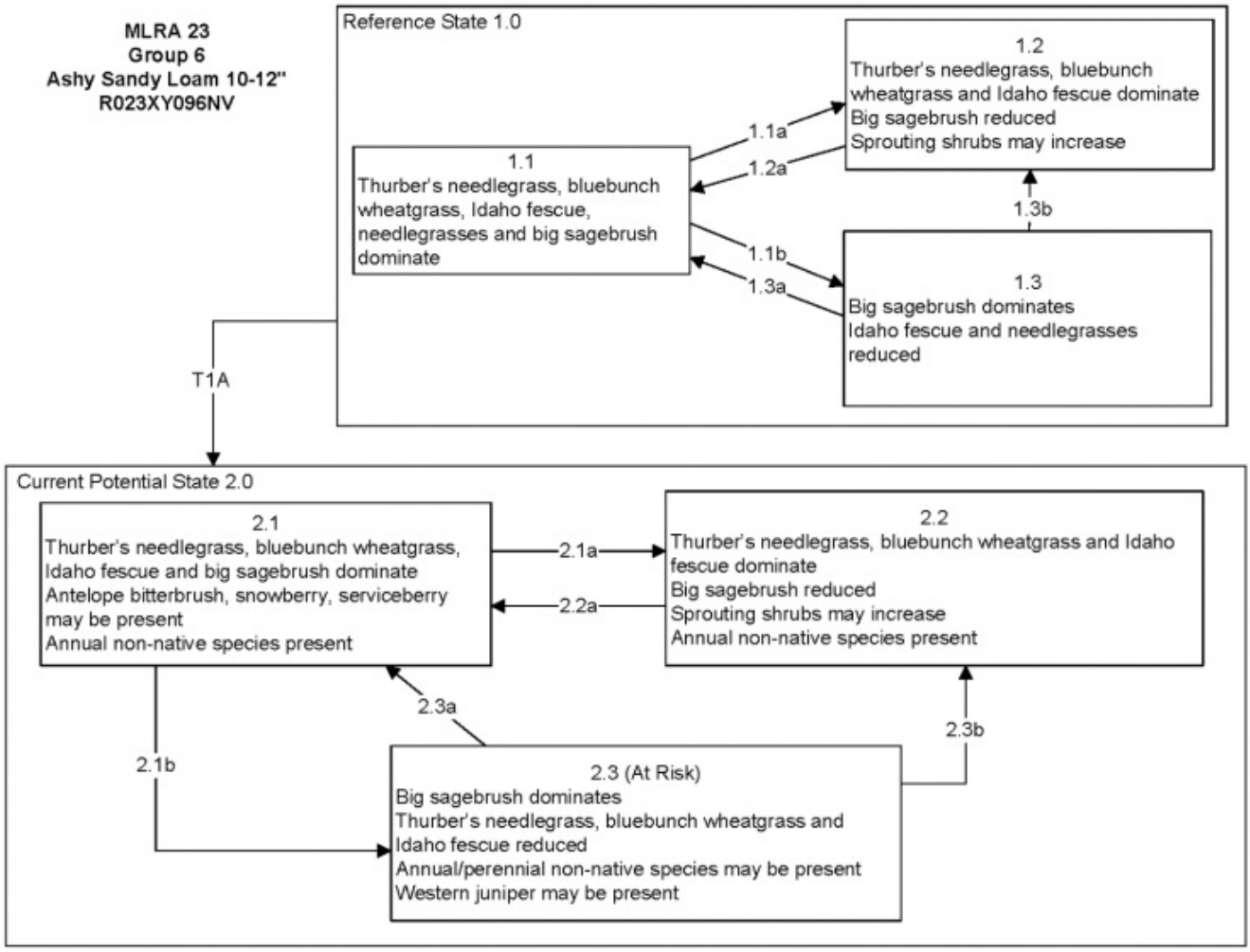
Ecological dynamics

Where management results in abusive grazing use by livestock and/or feral horses, woody plants, bottlebrush squirreltail, and Sandberg bluegrass increase as Thurber's needlegrass, bluebunch wheatgrass, and other desirable forage grasses decrease. Thistle

and cheatgrass are species likely to invade this site. Where this site occurs adjacent to juniper woodland communities these trees readily invade the site.

Fire Ecology:
The fire return interval for Wyoming big sagebrush communities ranges from 10 to 70 years. Fire is the principal means of renewal for decadent stands of Wyoming big sagebrush. Wyoming big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. Basin big sagebrush is readily killed when aboveground plant parts are charred by fire. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Antelope bitterbrush is considered a weak sprouter and is often killed by summer or fall fire. Antelope bitterbrush in some areas may sprout after light-severity spring fire. High fuel consumptions increase antelope bitterbrush mortality and therefore favors seedling establishment. 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. 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. Idaho fescue grows in a dense, fine-leaved tuft. Fires tend to burn within the accumulated fine leaves at the base of the plant and may produce temperatures sufficient to kill some of the root crown. Mature Idaho fescue plants are commonly reported to be severely damaged by fire in all seasons. Canby’s 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.

State and transition model


MLRA 23
Group 6
Ashy Sandy Loam 10-12"
R023XY096NV
Reference State 1.0
1.1
Thurber's needlegrass, bluebunch wheatgrass, Idaho fescue, needlegrasses and big sagebrush dominate
1.2
Thurber's needlegrass, bluebunch wheatgrass and Idaho fescue dominate
Big sagebrush reduced
Sprouting shrubs may increase
1.3
Big sagebrush dominates
Idaho fescue and needlegrasses reduced
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Thurber's needlegrass, bluebunch wheatgrass, Idaho fescue and big sagebrush dominate
Antelope bitterbrush, snowberry, serviceberry may be present
Annual non-native species present
2.2
Thurber's needlegrass, bluebunch wheatgrass and Idaho fescue dominate
Big sagebrush reduced
Sprouting shrubs may increase
Annual non-native species present
2.3 (At Risk)
Big sagebrush dominates
Thurber's needlegrass, bluebunch wheatgrass and Idaho fescue reduced
Annual/perennial non-native species may be present
Western juniper may be present
2.1a
2.2a
2.3a
2.3b
2.1b

MLRA 23
Group 6
Ashy Sandy Loam 10-12"
R023XY096NV
KEY

Reference State 1.0 Community Pathways
1.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs. A high severity Aroga moth infestation could also reduce sagebrush cover.
1.1b: Time and lack of disturbance allows for sagebrush to increase and become decadent; herbivory and/or chronic drought may also reduce fine fuels and lead to reduced fire frequency and increased shrub cover.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire, Aroga moth and/or herbivory, would create sagebrush/grass mosaic.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community. A high severity Aroga moth infestation may also reduce sagebrush cover.

Transition T1A: Introduction of non-native annual species.

Current Potential State 2.0 Community Pathways
2.1a: Low severity fire creates sagebrush/grass mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs. A high severity Aroga moth infestation could also reduce sagebrush cover; non-native annual species present.
2.1b: Time and lack of disturbance allows for shrubs to increase and become decadent; inappropriate grazing management and/or chronic drought may also reduce fine fuels and lead to reduced fire frequency and increased shrub cover.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire, Aroga moth and/or grazing management creates sagebrush/grass mosaic.
2.3b: High severity fire significantly reduces sagebrush cover, leading to early mid-seral community.

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by big sagebrush, Thurber's needlegrass, bluebunch wheatgrass and Idaho fescue. Potential vegetative composition is about 70% grasses, 10% forbs and 20% shrubs. Approximate ground cover (basal and crown) is about 25 to 35 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	471	706	863
Shrub/Vine	135	202	247
Forb	67	101	123
Total	**673**	**1009**	**1233**

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			625–1009	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	353–504	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	151–252	–
	Idaho fescue	FEID	*Festuca idahoensis*	101–202	–
2	**Secondary Perennial Grasses**			50–151	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6–30	–
	Webber needlegrass	ACWE3	*Achnatherum webberi*	6–30	–
	squirreltail	ELEL5	*Elymus elymoides*	6–30	–
	basin wildrye	LECI4	*Leymus cinereus*	6–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	6–30	–
Forb					
3	**Perennial**			50–151	

	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	6–30	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	6–30	–
	lupine	LUPIN	*Lupinus*	6–30	–
Shrub/Vine					
4	**Primary Shrubs**			121–282	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	20–81	–
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	34–67	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	34–67	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	34–67	–
5	**Secondary Shrubs**			20–81	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	10–30	–
	buckwheat	ERIOG	*Eriogonum*	10–30	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	10–30	–
	horsebrush	TETRA3	*Tetradymia*	10–30	–

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. 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. Idaho fescue provides important forage for many types of domestic livestock. The foliage cures well and is preferred by livestock in late fall and winter. Canby’s 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 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. Livestock browse Wyoming big

sagebrush, but may use it only lightly when palatable herbaceous species are available. Basin big sagebrush may serve as emergency food during severe winter weather, but it is not usually sought out by livestock. Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. Antelope bitterbrush is important browse for livestock. Domestic livestock and mule deer may compete for antelope bitterbrush in late summer, fall, and/or winter. Cattle prefer antelope bitterbrush from mid-May through June and again in September and October.

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:
Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. Basin big sagebrush is the least palatable of all the subspecies of big sagebrush. Basin big sagebrush is browsed by mule deer from fall to early spring, but is not preferred. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. 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. Pronghorn antelope, mule deer, elk, and bighorn sheep utilize antelope bitterbrush extensively. Mule deer use of antelope bitterbrush peaks in September, when antelope bitterbrush may compose 91 percent of the diet. Winter use is greatest during periods of deep snow. Antelope bitterbrush seed is a large part of the diets of rodents, especially deer mice and kangaroo rats. Thurber needlegrass is valuable forage for wildlife. 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. Idaho fescue provides important forage for several wildlife species. It is reported to be good forage for pronghorn, and deer in ranges of northern Nevada. Canby’s 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.

Hydrological functions

Runoff is high. Permeability is moderately rapid. Hydrologic soil group is C.

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

Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal. Some Native American peoples used the bark of big sagebrush to make rope and baskets. Native Americans used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing.

Other information

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish. Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed. Antelope bitterbrush has been used extensively in land reclamation. Antelope bitterbrush enhances succession by retaining soil and depositing organic material and in some habitats and with some ecotypes, by fixing nitrogen.

Type locality

Location 1: Washoe County, NV	
Township/Range/Section	T43N R23E S29
UTM zone	N
UTM northing	299114
UTM easting	4609631
Latitude	41° 36′ 47″
Longitude	119° 24′ 39″
General legal description	NE 1/4 SW 1/4, Along road to Wall Canyon south of County Road 8A, USF&WS Sheldon Refuge, Washoe County, Nevada. This site also occurs in 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)

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)	
Contact for lead author	
Date	01/16/2026
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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

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5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

    Sub-dominant:

    Other:

    Additional:

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

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-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:**

17. **Perennial plant reproductive capability:**