

Ecological site R028AY038NV

UPLAND WASH

Last updated: 6/12/2025

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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.

MLRA notes

Major Land Resource Area (MLRA): 028A–Ancient Lake Bonneville

MLRA 28A occurs in Utah (82%), Nevada (16%), and Idaho (2%). It makes up about 36,775 square miles. A large area west and southwest of Great Salt Lake is a salty playa. This area is the farthest eastern extent of the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. It is an area of nearly level basins between widely separated mountain ranges trending north to south. The basins are bordered by long, gently sloping alluvial fans. The mountains are uplifted fault blocks with steep side slopes. They are not well dissected because of low rainfall in the MLRA. Most of the valleys are closed basins containing sinks or playa lakes. Elevation ranges from 3,950 to 6,560 ft. in the basins and from 6,560 to 11,150 ft. in the mountains. Most of this area has alluvial valley fill and playa lakebed deposits at the surface. Great Salt Lake is all that remains of glacial Lake Bonneville. A level line on some mountain slopes indicates the former extent of this glacial lake. Most of the mountains in the interior of this area consist of tilted blocks of marine sediments from Cambrian to Mississippian age. Scattered outcrops of Tertiary continental sediments and volcanic rocks are throughout the area. The average annual precipitation is 5 to 12 ins. in the valleys and is as much as 49 ins. in the mountains. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The driest period is from midsummer to early autumn. Precipitation in winter typically occurs as snow. The average annual temperature is 39 to 53 °F. The freeze-free period averages 165 days and ranges from 110 to 215 days, decreasing in length with elevation. The dominant soil orders in this MLRA are Aridisols, Entisols, and Mollisols. The soils in the area dominantly have a mesic or frigid soil temperature regime, an aridic or xeric soil moisture regime, and mixed mineralogy. They generally are well drained, loamy or loamy-skeletal, and very deep.

Ecological site concept

This site occurs on the inset fans of mid- to upper fan piedmonts, alluvial fans, and mountain valley fans, and along ephemeral stream channels. Slope gradients of 4 to 8 percent are most typical. Elevations are 5000 to 6500 feet.

Average annual precipitation is 8 to 12 inches. Mean annual air temperature is 50 to 55 degrees F. The average growing season is about 90 to 120 days.

The soils of this site are deep alluvium from mixed sources. Generally, these soils are gravelly or cobbly throughout. Water intake rates are rapid, available water capacity is low, runoff is medium and soils are well drained. These soils are subject to periodic flood flows associated with intense summer convection storms.

The reference state is variable, however, big sagebrush, Indian ricegrass, Nevada ephedra and rubber rabbitbrush are the major species associated with this site. Potential vegetative composition is about 20% grasses, 5% forbs and 75% shrubs. Approximate ground cover (basal and crown) is 20 to 35 percent. Production ranges from 500 to 1000 pounds per acre.

Associated sites

R028AY013NV	SHALLOW CALCAREOUS LOAM 8-10 P.Z.
R028AY015NV	LOAMY 8-10 P.Z.

Similar sites

R028AY037NV	VALLEY WASH Valley Wash. ARTR2 minor shrub, if present; ATAC2 & GRSP major shrubs.
R028AY031NV	LOAMY FAN 8-10 P.Z. Loamy Fan 8-10
R028AY028NV	DROUGHTY LOAM 8-10 P.Z. Droughty Loam 8-10
R028AY032NV	DROUGHTY SODIC LOAM Droughty Sodic Loam. SAVE4-GRSP codominant shrubs; stable plant community.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i>

Physiographic features

This site occurs on the inset fans of mid- to upper fan piedmonts, alluvial fans, and mountain valley fans, and along ephemeral stream channels. Slope gradients of 4 to 8 percent are most typical. Elevations are 5000 to 6500 feet.

Table 2. Representative physiographic features

Landforms	(1) Inset fan (2) Alluvial fan (3) Fan
Elevation	1,524–1,981 m
Slope	4–8%

Climatic features

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 8 to 12 inches. Mean annual air temperature is 50 to 55 degrees F. The average growing season is about 90 to 120 days.

Mean annual precipitation at the LUND, NEVADA climate station (264745) is 10.04 inches.

January 0.78; February 0.85; March 1; April 0.98;
 May 0.95; June 0.82; July 0.69; August 0.87;
 September 0.77; October 0.92; November 0.69;
 December 0.73.

Table 3. Representative climatic features

Frost-free period (average)	105 days
Freeze-free period (average)	
Precipitation total (average)	254 mm

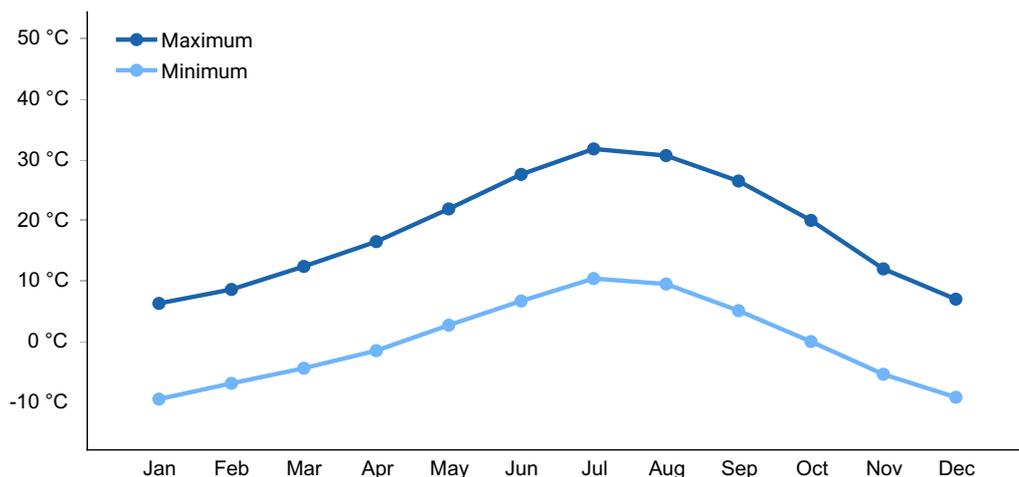


Figure 1. Monthly average minimum and maximum temperature

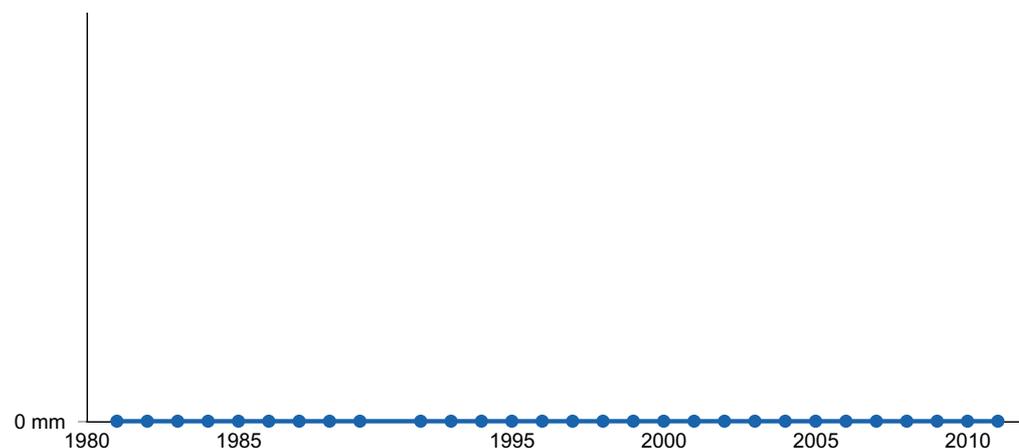


Figure 2. Annual precipitation pattern

Influencing water features

This site is adjacent to perennial stream and are subject to periodic flood flows associated with intense summer convection storms.

Soil features

The soils of this site are deep alluvium from mixed sources. Generally, these soils are gravelly or cobbly throughout. Water intake rates are rapid, available water capacity is low, runoff is medium and soils are well drained. These soils are subject to periodic flood flows associated with intense summer convection storms.

Ecological dynamics

This site is frequently disturbed by intense, natural, flood flows that can completely destroy all vegetation. The structure and composition of this plant community is very much dependent upon the time interval since the last devastating overflow event. Species likely to invade this site are annuals such as cheatgrass and mustards.

Ratings of ecological condition and determinations of similarity index are not applicable to this site due to the inherent instability of the plant community.

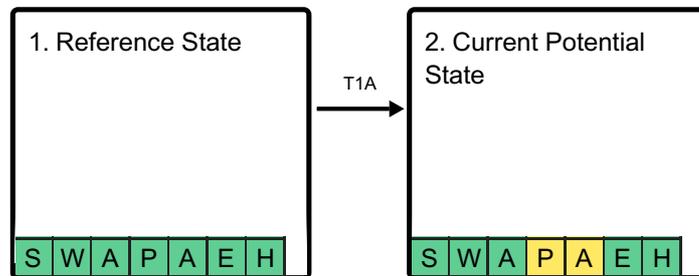
Fire Ecology:

Sagebrush steppe communities have historically been subjected to fires at varying intervals (25 to 70 years). Basin big sagebrush is readily killed when above ground 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. 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. Rubber rabbitbrush is often top-killed by fire. Rubber rabbitbrush is a fire-adapted species that is typically unharmed or enhanced by fire. Recovery time is often rapid to very rapid. Rubber rabbitbrush is often one of the first species to colonize burned areas by sprouting or from off-site seed. Nevada ephedra generally sprouts after fire damages above ground vegetation. Underground regenerative structures commonly survive when above ground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. Spiny hopsage is considered to be somewhat fire tolerant and often survives fires that kill sagebrush. Mature spiny hopsage generally sprout after being burned. Spiny hopsage is reported to be least susceptible to fire during summer dormancy. 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. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Needleandthread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread grass

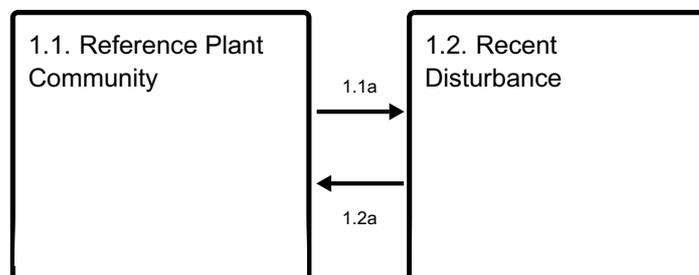
is classified as slightly to severely damaged by fire. Needleandthread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Galleta is a rhizomatous perennial which can resprout after top-kill by fire.

State and transition model

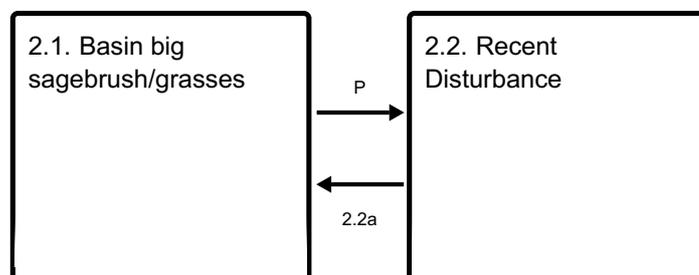
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1 Reference State

The Reference State 1 is a representative of the natural range of variability under pristine conditions. The reference state has 2 general community phases; a shrub-grass dominant phase and a recent disturbance phase. 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. Plant community phase changes are primarily driven by frequent, intense, natural, flood flows that can completely destroy all vegetation. The structure and composition of this plant community is very much dependent upon the time interval since the last devastating overflow event. Ratings of ecological condition and determinations of similarity index are not applicable to this site due to the inherent

instability of the plant community.

Community 1.1

Reference Plant Community

The plant community is variable, however, big sagebrush, Indian ricegrass, Nevada ephedra and rubber rabbitbrush are the major species associated with this site. Potential vegetative composition is about 20% grasses, 5% forbs and 75% shrubs. Approximate ground cover (basal and crown) is 20 to 35 percent. Fire Ecology: Sagebrush steppe communities have historically been subjected to fires at varying intervals (25 to 70 years). 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. 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. Rubber rabbitbrush is often top-killed by fire. Rubber rabbitbrush is a fire-adapted species that is typically unharmed or enhanced by fire. Recovery time is often rapid to very rapid. Rubber rabbitbrush is often one of the first species to colonize burned areas by sprouting or from off-site seed. Nevada ephedra generally sprouts after fire damages aboveground vegetation. Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. Spiny hopsage is considered to be somewhat fire tolerant and often survives fires that kill sagebrush. Mature spiny hopsage generally sprout after being burned. Spiny hopsage is reported to be least susceptible to fire during summer dormancy. 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. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Needleandthread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread grass is classified as slightly to severely damaged by fire. Needleandthread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Galleta is a rhizomatous perennial which can resprout after top-kill by fire.

Table 4. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	420	588	841
Grass/Grasslike	112	157	224
Forb	28	39	56
Total	560	784	1121

Community 1.2

Recent Disturbance

This phase occurs after a recent, intense flood flow. This type of disturbance removes much of the vegetation and leaves bare ground.

Pathway 1.1a

Community 1.1 to 1.2

Disturbance that removes vegetation. This is typically a intense flood flow, but could occur after a fire.

Pathway 1.2a

Community 1.2 to 1.1

Absence of disturbance. This allows time for the plant community to reestablish and recover from flooding or fire.

State 2

Current Potential State

This state is similar to the Reference State 1 with two similar 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 2.1

Basin big sagebrush/grasses

This community phase occurs after a period of time with out disturbance, such as a flood. Shrubs, grasses and forbs occur in this community phase. Non-native species are present in the community.

Community 2.2

Recent Disturbance

The recent disturbance community phase occurs after a flood or fire removes much of the plant community. Annual species, including non-native species are present in this

community phase.

Pathway P Community 2.1 to 2.2

Pathway 2.2a Community 2.2 to 2.1

Absence of disturbance.

Transition T1A State 1 to 2

Trigger: This transition is caused by the introduction of non-native annual plants, such as cheatgrass, mustards, and bur buttercup. 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.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	Primary Perennial Shrubs			322–714	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	235–353	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	39–157	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	16–78	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	16–63	–
	horsebrush	TETRA3	<i>Tetradymia</i>	16–63	–
2	Secondary Perennial Shrubs			39–196	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	8–39	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	8–39	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	8–39	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	8–39	–
	greasewood	SAVE4	<i>Sarcobatus</i>	8–39	–

			<i>vermiculatus</i>		
Grass/Grasslike					
3	Primary Perennial Grasses			34–220	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	16–78	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	16–63	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	1–39	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	1–39	–
4	Secondary Perennial Grasses			16–63	
	threeawn	ARIST	<i>Aristida</i>	4–24	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	4–24	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	4–24	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	4–24	–
Forb					
5	Secondary Perennial Forbs			16–63	
	globemallow	SPHAE	<i>Sphaeralcea</i>	4–24	–
	princesplume	STANL	<i>Stanleya</i>	4–24	–
6	Annual Forbs			1–39	

Animal community

Livestock Interpretations:

This site is suitable for livestock grazing. Grazing management should be keyed to dominant grasses or palatable shrubs production. Big sagebrush is eaten by domestic sheep and cattle, but has long been considered to be of low palatability to domestic livestock, a competitor with more desirable species, and a physical impediment to grazing. Basin big sagebrush may serve as emergency food during severe winter weather, but it is not usually sought out by livestock. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. In general, livestock forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by livestock. A few leaves and the more tender stems may also be used. Nevada ephedra is important winter range browse for domestic cattle, sheep and goats. Spiny hopsage provides a palatable and nutritious food source for livestock, particularly during late winter through spring. Domestic sheep browse the succulent new growth of spiny hopsage in late winter and early spring. 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. Bluegrass is a widespread forage grass. It is one of the

earliest grasses in the spring and is sought by domestic livestock and several wildlife species. Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. 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. When actively growing, galleta provides good to excellent forage for cattle and horses and fair forage for domestic sheep. Although not preferred, all classes of livestock may use galleta when it is dry. Domestic sheep show greater use in winter than summer months and typically feed upon central portions of galleta tufts, leaving coarser growth around the edges. Galleta may prove somewhat coarse to domestic sheep.

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:

Big sagebrush is highly preferred and nutritious winter forage for mule deer. Sage grouse are also highly dependent on big sagebrush for both food and cover. 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. Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. Wildlife forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by wildlife. A few leaves and the more tender stems may also be used. The forage value of rubber rabbitbrush varies greatly among subspecies and ecotypes. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Spiny hopsage provides a palatable and nutritious food source for big game animals. Spiny hopsage is used as forage to at least some extent by domestic goats, deer, pronghorn, and rabbits. Indian ricegrass is eaten by pronghorn in "moderate" amounts whenever available. In Nevada it is consumed by desert bighorns. 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. In Nevada, Indian ricegrass may even dominate jackrabbit diets during the spring through early summer months. 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. Desert bighorn sheep of the Mojave Desert utilize galleta as forage. Galleta provides moderately palatable forage when actively growing and relatively unpalatable forage during dormant periods. Galleta provides poor cover for most wildlife species.

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.

Hydrological functions

Runoff is medium.

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 hiking and has potential for upland and big game hunting.

Other products

Some Native American peoples used the bark of big sagebrush to make rope and baskets. 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. Native Americans used Nevada ephedra as a tea to treat stomach and kidney ailments. Some Native American peoples traditionally ground parched seeds of spiny hopsage to make pinole flour. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source.

Other information

Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed. 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. Nevada ephedra is useful for erosion control, and seedlings have been successfully planted onto reclaimed strip mines, with survival ranging from 12 to 94%. Atrazine may be effective in controlling Nevada ephedra, though some plants can survive through crown sprouting. Irrigation may increase control by atrazine. 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. Needleandthread grass is useful for stabilizing eroded or degraded sites.

Other references

Rangeland Sites:

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

Houghton, J.G., C.M. Sakamoto, and R.O. Gifford. 1975. Nevada's Weather and Climate, Special Publication 2. Nevada Bureau of Mines and Geology, Mackay School of Mines, University of Nevada, Reno, NV.

National Oceanic and Atmospheric Administration. 2004. The North American Monsoon. Reports to the Nation. National Weather Service, Climate Prediction Center. Available online: <http://www.weather.gov/>

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

Contributors

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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	04/02/2014
Approved by	Kendra Moseley
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 may occur after summer convection storms and spring runoff.

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2. **Presence of water flow patterns:** Water flow patterns are few to common, especially after summer convection storms and spring runoff. Water flow patterns are connected and long (>

5 ft).

3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas within water flow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground to 20%; surface rock fragments to 70%;

5. **Number of gullies and erosion associated with gullies:** Intense, natural flood flows may result in small gully development.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None Rock fragments protect the surface.

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 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 4 to 6 under plant canopies and 2 to 4 interspaces.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically weak coarse platy to moderate medium subangular blocky. Soil surface colors are light browns and grays and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

10. **Effect of community phase composition (relative proportion of different functional**

groups) and spatial distribution on infiltration and runoff: Sparse shrub canopy and associated litter provide some protection from raindrop impact. Perennial grasses aid in infiltration and reduce runoff.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Platy or massive sub-surface horizons are not to be interpreted as compacted layers.
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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 State: evergreen shrubs (big sagebrush)

Sub-dominant: associated shrubs > deep rooted, cool-season, perennial bunchgrasses > warm season perennial grasses > perennial forbs > annual forbs

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; mature bunchgrasses commonly ($\pm 25\%$) have dead centers.
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14. **Average percent litter cover (%) and depth (in):** Between plant interspaces up to 35% and depth $< \frac{1}{4}$ -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 ± 700 lbs/ac. Favorable years ± 1000 lbs/ac and unfavorable years ± 500 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, annual mustards, and salt cedar.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above-average growing season years. Reduced growth and reproduction occur during drought years.
