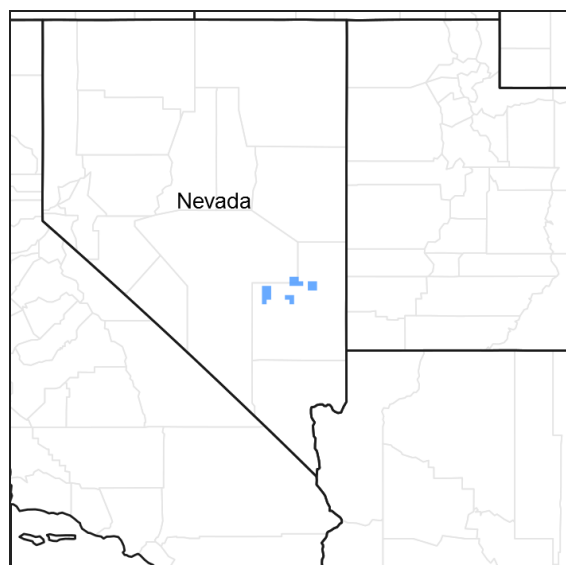


# **Ecological site R029XY099NV** **STONY CALCAREOUS HILL**

Accessed: 05/19/2024

## **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.



**Figure 1. Mapped extent**

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

## **Associated sites**

R029XY008NV	<b>SHALLOW CALCAREOUS LOAM 8-12 P.Z.</b>
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## **Similar sites**

R029XY081NV	<b>SHALLOW CALCAREOUS HILL 10-14 P.Z.</b> BEFR absent; JUOS & PIMO dominate visual aspect
R029XY040NV	<b>LIMESTONE HILL</b> CEIN7-ARNO4 codominant
R029XY151NV	<b>SHALLOW LIMESTONE HILL</b> CORA and PUST major shrubs
R029XY014NV	<b>SHALLOW CALCAREOUS SLOPE 8-12 P.Z.</b> BEFR absent
R029XY015NV	<b>SHALLOW CALCAREOUS HILL 8-10 P.Z.</b> PUST-JUOS major species; BEFR absent
R029XY047NV	<b>TRAVERTINE BAR</b> BEFR-ARNO4 codominant
R029XY008NV	<b>SHALLOW CALCAREOUS LOAM 8-12 P.Z.</b> More productive site; BEFR absent

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia nova</i> (2) <i>Mahonia fremontii</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i>

## Physiographic features

This site occurs on summits and sideslopes of eroded mountains, upper fan remnants and pediments. Slopes range from 8 to 50 percent. Elevation is 4600 to 6850 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Mountain (2) Fan remnant (3) Pediment
Elevation	1,402–2,088 m
Slope	8–50%
Aspect	Aspect is not a significant factor

## Climatic features

The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. Average annual precipitation is 8 to about 12 inches. Mean annual air temperature is 48 to 54 degrees F. The average growing season is about 120 to 140 days.

**Table 3. Representative climatic features**

Frost-free period (average)	140 days
Freeze-free period (average)	0 days
Precipitation total (average)	305 mm

## Influencing water features

There are no influencing water features associated with this site.

## Soil features

The soils associated with this site are very shallow to shallow and well to somewhat excessively drained. These soils are derived from colluvium parent material weathered from limestone or quartzite and are moderately to strongly calcareous. The soils have a very low available water capacity and very slow to moderate water intake rates. The soils are often modified with high amounts of rock fragments on the soils surface. Runoff is very high and potential for sheet and rill erosion is moderate. The soil series associated with this site are Amtoft and Ursine.

**Table 4. Representative soil features**

Surface texture	(1) Very gravelly loam (2) Extremely gravelly loam (3) Fine sandy loam
Family particle size	(1) Loamy

Drainage class	Well drained to somewhat excessively drained
Permeability class	Very slow to moderate
Soil depth	5–51 cm
Surface fragment cover <=3"	30–70%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	2.03–2.54 cm
Calcium carbonate equivalent (0-101.6cm)	0–80%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–9.6
Subsurface fragment volume <=3" (Depth not specified)	0–56%
Subsurface fragment volume >3" (Depth not specified)	0–15%

## Ecological dynamics

Where management results in abusive livestock use, needleandthread and Indian ricegrass decrease. Species likely to invade this site are introduced annuals such as cheatgrass. Singleleaf pinyon and Utah juniper will increase on this site.

### Fire Ecology:

Black sagebrush communities generally lack enough fine fuels to carry a fire. In addition to low fine fuel loading, wide shrub spacing makes fire infrequent or difficult to prescribe in black sagebrush types. Black sagebrush is highly susceptible to fire-caused mortality; plants are readily killed by all fire intensities. Following burning, reestablishment occurs through off-site sources. Fremont's barberry is moderately tolerant of fire. It is a vigorous sprouter following fire and may be favored by intense fire. 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. Historically a lack of continuous fuels to carry fires made fire rare to non-existent in communities where Nevada greasebush occurred. Increased presence of exotic annual grasses has greatly altered these fire regimes. Fire frequency and intensity has greatly increased. 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. Needleandthread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread is classified as slightly to severely damaged by fire. Needleandthread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire. Galleta is a rhizomatous perennial which can resprout after top-kill by fire.

## State and transition model

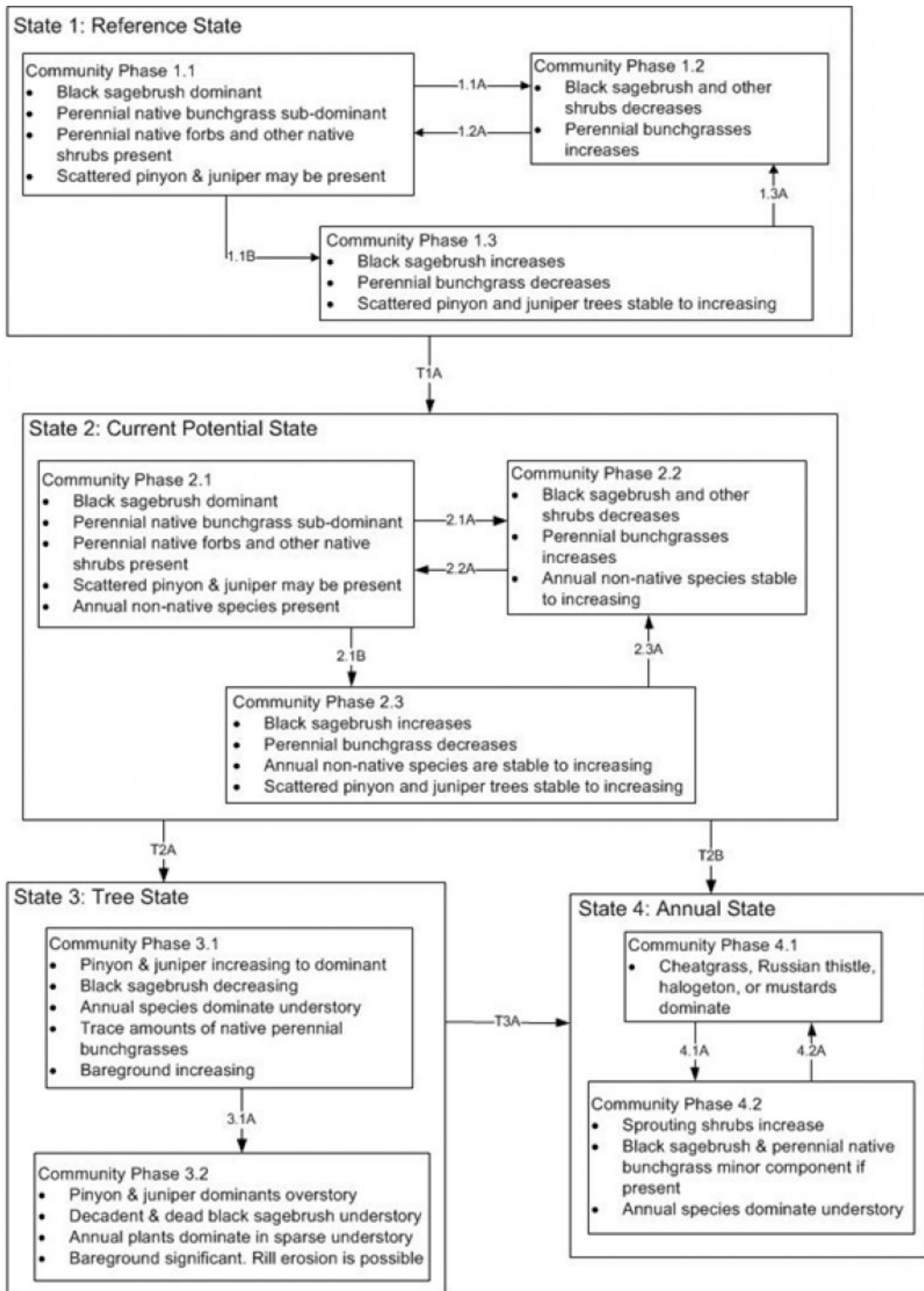


Figure 3. DRAFT STM

<p>State 1: Representative of the reference conditions prior to Euro-American settlement in the west.</p> <p>1.1A: fire or other disturbance that removes sagebrush canopy</p> <p>1.1B: absence of disturbance and natural regeneration over time</p> <p>1.2A: absence of disturbance and natural regeneration over time</p> <p>1.3A: fire or other disturbance that removes sagebrush canopy</p> <p>T1A: introduction of non-native species</p> <p>State 2: Representative of the current potential with the presence of non-native annuals. Non-native annuals have the ability to significantly change disturbance regimes and nutrient cycling dynamics.</p> <p>2.1A: fire or other disturbance that removes sagebrush canopy</p> <p>2.1B: absence of disturbance and natural regeneration over time, may be coupled with inadequate rest and recovery from defoliation</p> <p>2.2A: absence of disturbance and natural regeneration over time</p> <p>2.3A: fire or other disturbance that removes sagebrush canopy</p> <p>T2A: long term absence of fire and natural regeneration of pinyon &amp; juniper trees</p> <p>T2B: reoccurring severe fire</p> <p>State 3: Dominated by pinyon and/or juniper trees. Changes in disturbance return intervals over the long term allows for pinyon and/or juniper to dominate the site by controlling site resources.</p> <p>3.1A: absence of disturbance and natural regeneration over time</p> <p>T3A: reoccurring severe fire</p> <p>State 4: Dominated by non-native annuals. Changes in disturbance return intervals and nutrient dynamics creating a positive feedback loop.</p> <p>4.1A: absence of disturbance and natural regeneration over time</p> <p>4.2A: fire or other disturbance that removed shrub canopy</p>
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Figure 4. DRAFT STM LEGEND

State 1  
Reference State

Community 1.1  
Reference Plant Community

The reference plant community is dominated by black sagebrush and Indian ricegrass. Other important species on this site are Fremont barberry, Nevada greasebush and Nevada ephedra. Potential vegetative composition is about 40% grasses 5% forbs and 55% shrubs and trees. Approximate ground cover (basal and crown) is 10 to 20 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	149	235	352
Grass/Grasslike	112	179	269
Forb	15	22	34
Tree	4	11	18
Total	280	447	673

State 2  
Current Potential State

State 3  
Tree State

State 4  
Annual State

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			130–269	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	90–157	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	22–67	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	9–22	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	9–22	
2	Secondary Perennial Grasses			9–36	
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	2–13	–
	threeawn	ARIST	<i>Aristida</i>	2–13	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	2–13	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	2–13	–
Forb					
3	Perennial			9–36	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	90–157	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	22–67	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	9–22	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	2–13	–
	draba	DRABA	<i>Draba</i>	2–9	–
	buckwheat	ERIOG	<i>Eriogonum</i>	2–9	
	globemallow	SPHAE	<i>Sphaeralcea</i>	2–9	–
	desert princesplume	STPI	<i>Stanleya pinnata</i>	2–9	–
4	Annual			1–22	
Shrub/Vine					
5	Primary Shrubs			189–293	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	157–202	–
	Fremont's mahonia	MAFR3	<i>Mahonia fremontii</i>	22–67	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	9–22	–
	spiny greasebush	GLSPA	<i>Glossopetalon spinescens</i> var. <i>aridum</i>	1–13	–
6	Secondary Shrubs			22–67	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	4–13	–
	littleleaf mountain mahogany	CEIN7	<i>Cercocarpus intricatus</i>	4–13	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	4–13	–
	desert bitterbrush	PUGL2	<i>Purshia glandulosa</i>	4–13	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	4–13	–
	banana yucca	YUBA	<i>Yucca baccata</i>	4–13	–
Tree					
7	Evergreen			4–18	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	2–9	–
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	2–9	

## **Animal community**

### **Livestock Interpretations:**

This site has limited value for livestock grazing due to steep slopes and stony surface soils. Grazing management should be keyed to perennial grass production. Indian ricegrass has good forage value for domestic sheep, cattle and horses. 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. 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. In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep. Fremont's barberry browse contains toxic alkaloids and is slightly poisonous and unpalatable to livestock. Nevada ephedra is important winter range browse for domestic cattle, sheep and goats. Nevada greasebush has low forage value for livestock.

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:**

Black sagebrush is a significant browse species within the Intermountain region. It is especially important on low elevation winter ranges in the southern Great Basin, where extended snow free periods allow animal's access to plants throughout most of the winter. In these areas it is heavily utilized by pronghorn and mule deer. 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. Leks are often located on low sagebrush sites, grassy openings, dry meadows, ridgetops, and disturbed sites. Fremont's barberry is an important forage species for many wildlife species. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Nevada greasebush has low forage value for wildlife. 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. Galleta provides moderately palatable forage when actively growing and relatively unpalatable forage during dormant periods. Galleta provides poor cover for most wildlife species.

## **Hydrological functions**

Runoff is medium to very high. Permeability is very slow to 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 camping and hiking and has potential for upland and big game hunting.

## **Other products**

Native Americans used Nevada ephedra as a tea to treat stomach and kidney ailments. Indian ricegrass was traditionally eaten by some Native American peoples. The Paiutes used seed as a reserve food source.

## **Other information**



Black sagebrush is an excellent species to establish on sites where management objectives include restoration or improvement of domestic sheep, pronghorn, or mule deer winter range. 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. Indian ricegrass is well-suited for surface erosion control and desert revegetation although it is not highly effective in controlling sand movement. Needleandthread is useful for stabilizing eroded or degraded sites. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

## 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

RWA

## 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	05/15/2013
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rills are none to rare. Rock fragments armor the soil surface.

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2. **Presence of water flow patterns:** Waterflow patterns are none to rare (short and stable).

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is usually limited to areas of waterflow patterns.

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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  $\pm$  10-25% depending on amount of surface rock fragments.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None
- 
7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope (<5 m) 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 3 to 6 on most soil textures found on this site. (To be field tested.)
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is thick or thin platy, or fine granular. Soil surface colors are light browns or grays and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically <1 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses) slow runoff and increase infiltration. Shrubs 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. Subsoil petrocalcic horizons or duripans should 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: Low evergreen shrubs (black sagebrush) >deep-rooted, cool season, perennial bunchgrasses
- Sub-dominant: associated shrubs > warm season rhizomatous grasses = deep-rooted, cool season, perennial forbs > fibrous, shallow-rooted, cool season, perennial forbs > annual forbs
- Other: shallow-rooted cool season perennial bunchgrasses and warm season perennial bunchgrasses, evergreen trees, succulents
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead branches within shrubs are common and standing dead shrub canopy material may be as much as 25% of total shrub canopy; mature bunchgrasses (<25%) may have dead centers.
- 
14. **Average percent litter cover (%) and depth ( in):** Under canopy and within interspaces (10-20%) 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 May)  $\pm 200$  lbs/ac. Favorable years  $\pm 350$  lbs/ac and unfavorable years  $\pm 75$  lbs/ac.
- 
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 Russian thistle, annual mustards, and cheatgrass.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Reduced growth and reproduction occur during drought years.
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