USDA Natural Resources Conservation Service

Ecological site R029XY104NV
SHALLOW CLAY LOAM 10-12 P.Z.

Accessed: 05/10/2025

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.

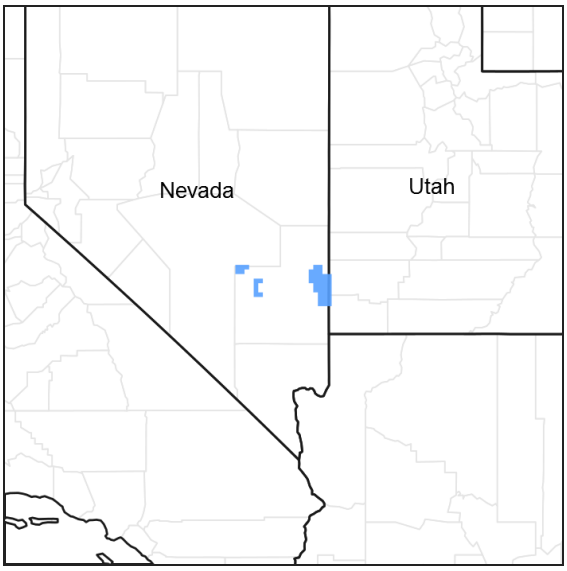

Figure 1. Mapped extent

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

F029XY066NV	**PIMO-JUOS WSG 1R0501 12 to 16**
F029XY069NV	**PIMO-JUOS WSG 0R0504 12 to 16**

Similar sites

R029XY008NV	**SHALLOW CALCAREOUS LOAM 8-12 P.Z.** ACHY-HECO26 codominant grasses; ACTH7 absent
R029XY045NV	**STONY CALCAREOUS SLOPE 8-12 P.Z.** ACSP12 codominant grass
R029XY015NV	**SHALLOW CALCAREOUS HILL 8-10 P.Z.** PUST-JUOS major species; ACTH7 absent
R029XY014NV	**SHALLOW CALCAREOUS SLOPE 8-12 P.Z.** Less productive site; ACTH7 absent
R029XY099NV	**STONY CALCAREOUS HILL** BEFR important shrub; ACTH7 absent
R029XY028NV	**SHALLOW CALCAREOUS SLOPE 12-14 P.Z.** PSSPI dominant grass

R029XY081NV	**SHALLOW CALCAREOUS HILL 10-14 P.Z.** Less productive site; ACTH7 absent

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia nova*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Achnatherum thurberianum*

Physiographic features

This site occurs on ridges and sideslopes of upper fan remnant slopes, hills, and mountains on all exposures. Slopes range from 2 to 75 percent, but slope gradients of 2 to 30 percent are most typical. Elevations are 5000 to about 8300 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Mountain (3) Ridge
Elevation	5,000–8,300 ft
Slope	2–75%
Aspect	Aspect is not a significant factor

Climatic features

The climate is cool, semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 14 inches. Mean annual air temperature is 45 to 54 degrees F. The average growing season is about 80 to 130 days.

Table 3. Representative climatic features

Frost-free period (average)	130 days
Freeze-free period (average)	0 days
Precipitation total (average)	14 in

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. These soils are often modified with high amounts of gravels, cobbles, or stones on the surface that occupy plant growing space and reduce the potential soil moisture-holding capacity. The available water capacity is very low to low and varies with soil texture, amount of rock fragments within the soil profile, and soil depth. Soil series associated with this site include Lien, Newvil, Stewval, and Zadvar.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly fine sandy loam (3) Very stony fine sandy loam

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	4–20 in
Surface fragment cover <=3"	30–60%
Surface fragment cover >3"	3–22%
Available water capacity (0-40in)	0.3–2.1 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–9.6
Subsurface fragment volume <=3" (Depth not specified)	24–47%
Subsurface fragment volume >3" (Depth not specified)	2–18%

Ecological dynamics

Where management results in abusive grazing use by cattle or horses, black sagebrush and rabbitbrush increase while Thurber's needlegrass, Indian ricegrass and muttongrass decrease. With excessive use by sheep, black sagebrush and forbs often decrease as rabbitbrush increases. Utah juniper and singleleaf pinyon readily increase/invade on this site where it occurs adjacent to these woodland areas.

Fire Ecology:
Fire return intervals for black sagebrush communities range from 35 to over 100 years. 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. 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. 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. Thurber 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. Burning has been found to decrease the vegetation and reproductive vigor. Early season burning is more damaging to this needlegrass than late season burning. Needleandthread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needleandthread grass in sagebrush ecosystems is classified as slightly damaged by fire, and in intermountain rangelands, as severely damaged. 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. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire. Blue grama has variable fire tolerance; it has fair tolerance when dormant but experiences some damage if burned during active growth, especially during drought. Fire generally favors blue grama, generally increasing its occurrence, production, and percent cover.

State and transition model

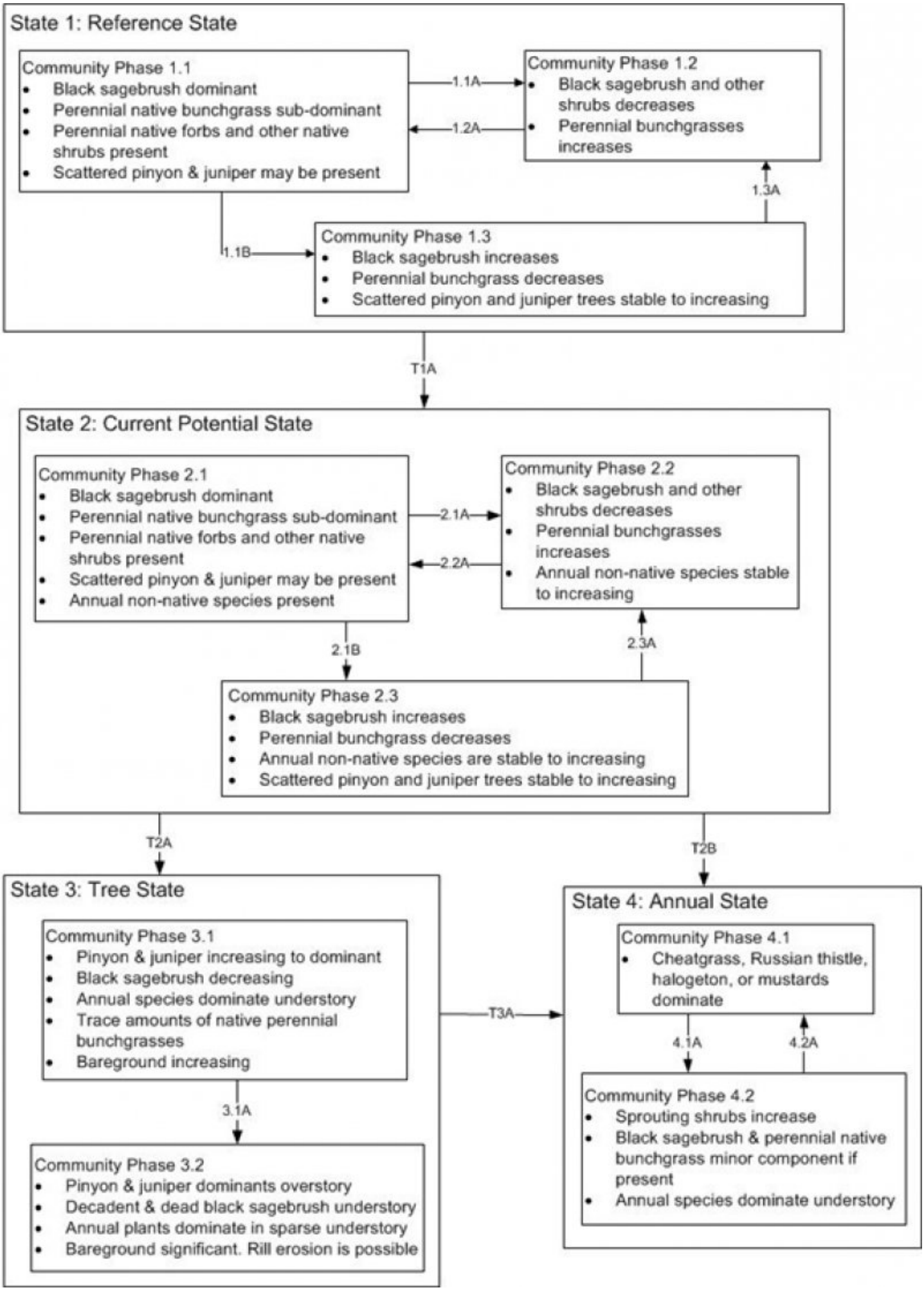

Figure 4. DRAFT STM

State 1: Representative of the reference conditions prior to Euro-American settlement in the west.
1.1A: fire or other disturbance that removes sagebrush canopy
1.1B: absence of disturbance and natural regeneration over time

1.2A: absence of disturbance and natural regeneration over time

1.3A: fire or other disturbance that removes sagebrush canopy

T1A: introduction of non-native species

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.
2.1A: fire or other disturbance that removes sagebrush canopy
2.1B: absence of disturbance and natural regeneration over time, may be coupled with inadequate rest and recovery from defoliation

2.2A: absence of disturbance and natural regeneration over time

2.3A: fire or other disturbance that removes sagebrush canopy

T2A: long term absence of fire and natural regeneration of pinyon & juniper trees
T2B: reoccurring severe fire

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.
3.1A: absence of disturbance and natural regeneration over time

T3A: reoccurring severe fire

State 4: Dominated by non-native annuals. Changes in disturbance return intervals and nutrient dynamics creating a positive feedback loop.
4.1A: absence of disturbance and natural regeneration over time
4.2A: fire or other disturbance that removed shrub canopy

Figure 5. DRAFT STM LEGEND

State 1
Reference State

Community 1.1
Reference Plant Community

The reference plant community is dominated by black sagebrush, Thurber's needlegrass, Indian ricegrass, and needleandthread. Muttongrass, blue grama and green ephedra are other important species associated with this site. Potential vegetative composition is about 55% grasses 5% forbs and 40% shrubs and scattered trees. Approximate ground cover (basal and crown) is 20 to 35 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	192	275	385
Shrub/Vine	126	180	252
Forb	18	25	35
Tree	14	20	28
Total	**350**	**500**	**700**

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 (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			155–355	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	75–150	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	50–100	–
	needle and thread	HECO26	*Hesperostipa comata*	10–40	–
	muttongrass	POFE	*Poa fendleriana*	10–40	–
	blue grama	BOGR2	*Bouteloua gracilis*	10–25	–
2	**Secondary Perennial Grasses**			10–40	
	pine needlegrass	ACPI2	*Achnatherum pinetorum*	3–15	–
	squirreltail	ELEL5	*Elymus elymoides*	3–15	–
	James' galleta	PLJA	*Pleuraphis jamesii*	3–15	–
	Sandberg bluegrass	POSE	*Poa secunda*	3–15	–
Forb					
3	**Perennial**			10–40	
	blue grama	BOGR2	*Bouteloua gracilis*	10–25	–
	globemallow	SPHAE	*Sphaeralcea*	3–10	–
4	**Annual**			1–15	
	Forb, perennial	2FP	*Forb, perennial*	6–30	–
	globemallow	SPHAE	*Sphaeralcea*	3–10	–
Shrub/Vine					
5	**Primary Shrubs**			135–200	
	black sagebrush	ARNO4	*Artemisia nova*	125–175	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	10–25	–
6	**Secondary Shrubs**			25–75	
	fourwing saltbush	ATCA2	*Atriplex canescens*	5–15	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	5–15	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	5–15	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	5–15	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	5–15	–
Tree					
7	**Evergreen**			6–20	
	Utah juniper	JUOS	*Juniperus osteosperma*	3–10	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	3–10	–

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to perennial grass production. 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. 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. 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. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. Blue grama is valuable forage for all classes of domestic livestock, providing excellent forage for cattle and sheep. Blue grama tends to be most productive following summer rains, but it cures well and provides forage year round. In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep. Black sagebrush may be lethal to sheep if it comprises the bulk of the diet for even a short time. Decreases in black sagebrush indicate a downward trend in grazing condition. Nevada ephedra is important winter range browse for domestic cattle, sheep and goats.

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:
In winter, at lower elevations, black sagebrush is heavily utilized by pronghorn and mule deer. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. 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. Thurber needlegrass is valuable forage for wildlife. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use muttongrass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas. Blue grama also provides important forage for mule deer. Quail and some songbirds eat the seeds of blue grama. Small mammals also eat blue grama seeds and stems. Flower heads and seeds of blue grama are also consumed by grasshoppers, which can all but eliminate an annual seed crop.

Hydrological functions

Rills and water flow patterns are rare but can be expected in areas recently subjected to summer convection storms or rapid snowmelt, usually on steeper slopes. Pedestals are rare. Occurrence is usually limited to areas of water flow patterns. Frost heaving of shallow rooted plants should not be considered an indicator of soil erosion. Gullies are rare in areas of this site that occur on stable landforms. Where this site occurs on inset fans, gullies and head cuts associated with ephemeral channel entrenchment are rare to common. Gullies and head cuts should be healing or stable. 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. Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass & 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

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. Because of its wide adaptation, ease of establishment, and economic value, blue grama is used extensively for conservation purposes, rangeland seeding, and landscaping. Blue grama is useful for reclamation and for erosion control in arid and semiarid regions.

Type locality

Location 1: Nye County, NV	
Township/Range/Section	T9N R48E S32
General legal description	About 1½ miles northeast of Daugherty Ranch, Willow Creek area, Monitor Range, Toiyabe National Forest, Nye 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

GKB

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	02/21/2007
Approved by	P.Novak-Echenique
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 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.

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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 an indicator of soil erosion.

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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 variable but often more than 35%; shrub canopy 25 to 35%; 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 and head cuts associated with ephemeral channel entrenchment are rare to common. 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-colored and soils are typified by an ochric epipedon. Organic carbon of the surface 2 to 4 inches is typically less than 1 percent dropping off quickly below. 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., Indian ricegrass & 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 (Indian ricegrass & Thurber""s needlegrass) > low shrubs (black sagebrush). By above ground production)

Sub-dominant: Deep-rooted, cool season, perennial forbs = associated shrubs = shallow-rooted, cool season, perennial bunchgrasses > fibrous, shallow-rooted, cool season, perennial forbs = 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 20% of total woody canopy; some of the mature bunchgrasses (<10%) have dead centers.

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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) ±500 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:** Cheatgrass is an invader on this site. Rabbitbrush, Utah juniper, and singleleaf pinyon are increasers 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.
