USDA Natural Resources
Conservation Service

Ecological site R022AZ041CA
ERODED SLOPE 14-20 P.Z.

Accessed: 05/21/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 022A–Sierra Nevada and Tehachapi Mountains

This ESD was developed using older policy requirements which have been improved with the intent of improving ESD products overall. Users should approach these materials with some caution as the content herein, while likely useful for some purposes, was developed within parameters now recognized as needing varying levels of improvement. As always, a site-specific investigation is highly recommended when site-specific management alternatives are to be developed and/or management decisions are to be made.

Each ESD is an interpretation of the ecological relationships between biotic and abiotic aspects of the landscape. Users of this document should be aware of the limitations of this tool to the extent that specific local conditions may not be entirely captured within the ESD. In particular, management decisions should be supported by site-specific inventories, assessments and planning processes based on the best available information including and extending beyond the ESD.

An ESD is not a permanent determination of ecological dynamics. Rather, each ESD is an evolving body of work intrinsically tied to the soil surveys and data associated with soil map unit components of correlated soil-ecological site relationships. As new information becomes available, updates may be made or may be underway at any given time. Minor updates may be made without announcement when such changes do not modify the ecological site concept, the soils correlated or the state-and-transition model.

Associated sites

R022AY022NV	**LOAMY SLOPE 14-16 P.Z.**

R022AY023NV	**LOAMY SLOPE 16-20 P.Z.**
R022AY028NV	**CLAYPAN 16+ P.Z.**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana* (2) *Purshia tridentata*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs on mountain sideslopes. Slopes range from 15 to 75 percent, but slope gradients of 4 to 30 percent are most typical. Elevations are 6000 to 8000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	1,829–2,438 m
Slope	15–75%
Aspect	Aspect is not a significant factor

Climatic features

The climate on this site is subhumid-continental, characterized by cold, moist winters, and cool dry summers. The average annual precipitation ranges from 16 to 24 inches, mostly occurring as snow. The mean annual air temperature ranges from 39 to 45 degrees F. The average frost free growing season is 40 to 70 days. Climate data used to support this section were derived from PRISM and is not specifically tied to any dominant climate station.

Table 3. Representative climatic features

Frost-free period (average)	70 days
Freeze-free period (average)	0 days
Precipitation total (average)	610 mm

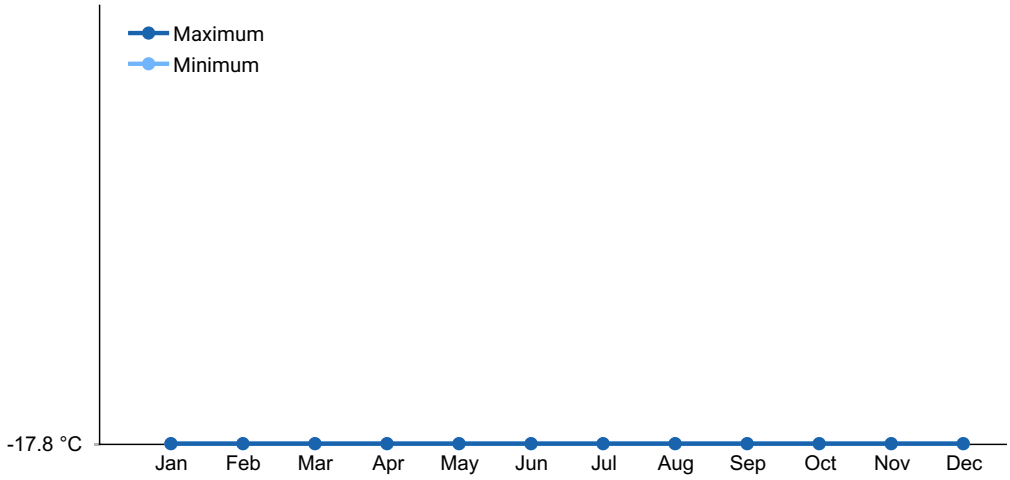

Figure 1. Monthly average minimum and maximum temperature

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 drained. Soils were formed in residuum and colluvium from andesite, tuff, and tuff-breccia. The soils are skeletal with high rock content. Runoff is very high and permeability is moderate. Available water capacity is very low. The soils are usually moist in the moisture control section during late fall, winter, and spring. Soils are dry from July through October. Soil series associated with this site include: Carshal.

CA729 Toiyabe National Forest Area, California
380;Joecut-Celeridge-Gerdog association;Carshal
381;Joecut-Heenlake association;Carshal
390;Heenlake-Loope-Chenhigh association;Carshal
400;Pinew-Carshal-Loope association;Carshal
440;Dogbed-Celeridge-Carshal association;Carshal
450;Carshal-Loope-Rock outcrop complex, 15 to 75 percent slopes;Carshal
590;Loope-Heenlake-Carshal association;Carshal
591;Loope-Heenlake-Celeridge association;Carshal
592;Loope-Pinew-Heenlake association;Carshal

Table 4. Representative soil features

Parent material	(1) Residuum–andesite (2) Colluvium–tuff
Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy

Drainage class	Well drained
Permeability class	Moderate
Soil depth	10–36 cm
Surface fragment cover <=3"	45–50%
Surface fragment cover >3"	7–10%
Available water capacity (0-101.6cm)	1.02–1.27 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)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	30–50%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

As ecological condition declines, big sagebrush, and rabbitbrush will increase as the perennial grasses decrease.
Species most likely to invade this site are cheatgrass, mustards and other annual forbs.
Singleleaf pinyon and Utah juniper will increase on this site where it occurs adjacent to these woodlands.

Fire Ecology:
Presettlement fire return intervals in mountain big sagebrush communities varied from 15 to 25 years. 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 fires. Antelope bitterbrush in some areas may sprout after light-severity spring fires. High fuel consumptions increase antelope bitterbrush mortality and therefore favors seedling establishment. 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. Western needlegrass is moderately damaged by fire. The recovery time is between 3 and 5 years. Thurber’s needlegrass is 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. Basin

wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

State and transition model

Ecosystem states

1. Reference State

State 1 submodel, plant communities

1.1. Reference Plant Community

State 1
Reference State

Community 1.1
Reference Plant Community

The reference plant community is characterized by an open canopy of soft-woody shrubs with an understory of perennial grasses. The plant community is dominated by Indian ricegrass, needlegrasses, basin wildrye, mountain big sagebrush, and antelope bitterbrush. Potential vegetative composition is about 20% grasses, 10% forbs and 65% shrubs and trees.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	73	110	146
Grass/Grasslike	22	34	45
Forb	11	17	22
Tree	6	8	11
Total	**112**	**169**	**224**

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**			21–50	
	basin wildrye	LECI4	*Leymus cinereus*	3–17	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	9–17	–
	western needlegrass	ACOCO	*Achnatherum occidentale ssp. occidentale*	4–9	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	4–8	–
2	**Secondary Perennial Grasses**			6–17	
	squirreltail	ELEL5	*Elymus elymoides*	1–3	–
	Sandberg bluegrass	POSE	*Poa secunda*	1–3	–
Forb					
3	**Perennial Forbs**			9–26	
	rockcress	ARABI2	*Arabis*	1–6	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	1–6	–
	phlox	PHLOX	*Phlox*	1–6	–
4	**Annual Forbs**			1–6	
Shrub/Vine					
5	**Primary Shrubs**			102–126	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	59–84	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	26–41	–
6	**Secondary Shrubs**			9–26	
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	2–6	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	2–6	–
	desert peach	PRAN2	*Prunus andersonii*	2–6	–
Tree					
7	**Evergreen**			6–11	
	Jeffrey pine	PIJE	*Pinus jeffreyi*	1–3	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	1–3	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage 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. Western needlegrass has a spreading and deeply penetrating root system, which makes it resistant to trampling. 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. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses. 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:
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. Western needlegrass provides valuable forage for many species of wildlife. Thurber needlegrass is valuable forage for wildlife. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for a longer time than other grasses. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. 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.

Hydrological functions

Runoff is very high and permeability is moderate.

Other products

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source. Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand. 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

Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment. 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: Alpine County, CA	
Township/Range/Section	T9N R20E S13
Latitude	38° 37′ 16″
Longitude	119° 43′ 0″
General legal description	Toiyabe National Forest, 0.5 mile south of Centerville Flat.

Other references

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

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

Contributors

ALM/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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

   _____

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

   _____

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

   _____

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

   _____

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:**
