USDA Natural Resources
Conservation Service

Ecological site R022AZ042CA
SHALLOW LOAM 16-20 P.Z.

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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): 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*
Herbaceous	(1) *Achnatherum occidentale*

Physiographic features

This site occurs on mountains. Slopes range from 4 to 75 percent, but slope gradients of 4 to 30 percent are most typical. Elevations are 5400 to over 8600 feet.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin
Elevation	1,646–2,621 m
Slope	4–30%

Climatic features

Average annual precipitation is 16 inches to 24 inches. Mean annual air temperature is 39 to 45 degrees F. The average growing season is about 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

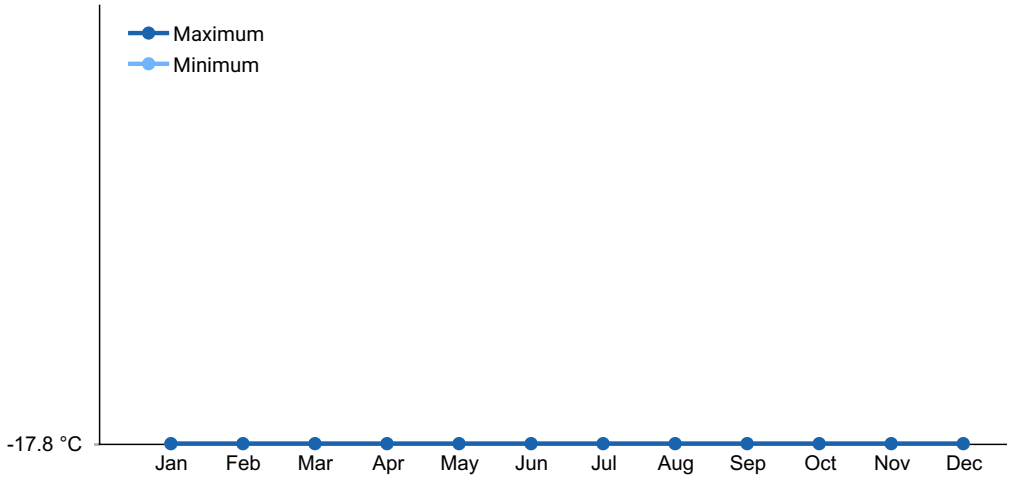

Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow, well drained, and formed in colluvium and residuum derived from tuff, tuff-breccia and andesite. An argillic horizon and a mollic epipedon occur from the soil surface to 14 inches. Runoff is very high and permeability is moderate. The soils are usually moist in the moisture control section during late fall, winter, and spring, and dry from July through early October. Soil series associated with this site include: Loope.

CA729 Toiyabe National Forest Area, California
235;Hawkinspeak-Angelwhine association;Loope
350;Leroman-Chenhigh-Celeridge association;Loope
370;Celeridge-Gerdog-Loope association;Loope
380;Joecut-Celeridge-Gerdog association;Loope
381;Joecut-Heenlake association;Loope
390;Heenlake-Loope-Chenhigh association;Loope
391;Heenlake-Loope-Dogbed association;Loope
392;Heenlake-Loope association;Loope
400;Pinew-Carshal-Loope association;Loope
430;Newcone-Rock outcrop complex, 30 to 75 percent slopes;Loope
440;Dogbed-Celeridge-Carshal association;Loope
450;Carshal-Loope-Rock outcrop complex, 15 to 75 percent slopes;Loope

520;Canfire-Crispy-Rock outcrop association;Loope
580;Murain-Shorthike association;Loope
581;Murain association;Loope
590;Loope-Heenlake-Carshal association;Loope
591;Loope-Heenlake-Celeridge association;Loope
592;Loope-Pinew-Heenlake association;Loope

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	36–51 cm
Surface fragment cover <=3"	30–50%
Surface fragment cover >3"	5–6%
Available water capacity (0-101.6cm)	3.3–3.56 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)	60–75%
Subsurface fragment volume >3" (Depth not specified)	1–5%

Ecological dynamics

As ecological condition declines, big sagebrush, snowberry and other woody plants increase in prevalence as western needlegrass, basin wildrye and other perennial grasses and forbs decline in the understory.

Fire Ecology:
The fire return interval in mountain big sagebrush communities ranges from 15 to 40 years. Very frequent fire suppresses mountain big sagebrush establishment, while long fire return intervals promote tree invasion into mountain big sagebrush communities. Mountain

big sagebrush is highly susceptible to injury from fire. Plants are readily killed in all seasons, even by light severity fires. Mountain big sagebrush plants top-killed by fire will not resprout. Regeneration of mountain big sagebrush is from on-site or off-site seed. Depending on circumstances of the environment and seed source, mountain big sagebrush seeds may sprout profusely the spring after burning, or very sparsely.

Antelope bitterbrush is highly susceptible to fire. Some ecotypes sprout following fire, either from dormant buds encircling an aboveground root crown, from calluses of meristematic tissue beneath the bark, or from dormant buds on a belowground lignotuber. Very young and very old plants (younger than 5 or older than 40-60 years) do not sprout well.

Western needlegrass is classified as "moderately" resistant, but depending on the season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Aboveground vegetation of western needlegrass is often consumed by fire. The distribution of fuels within the plant influences the severity and length of burn time. Fire in the many leafy vegetative culms can promote burning beneath the soil surface, producing subsurface charring. The abundant dead material which is sometimes present with western needlegrass contributes to fire damage regardless of season. Post burn regeneration usually occurs by seed. Western needlegrass has also adapted to fire by regenerating by fire-enhanced flowering.

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 and a dense understory of perennial grasses. The plant community is dominated by western needlegrass, basin wildrye mountain big sagebrush and antelope bitterbrush. Potential vegetative composition is about 50% grasses, 10% forbs, and 40% shrubs. Approximate ground cover(basal and crown) is 15 to 30 percent

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	224	336	448
Shrub/Vine	157	235	314
Forb	45	67	90
Tree	22	34	45
Total	**448**	**672**	**897**

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**			314–448	
	western needlegrass	ACOCO	*Achnatherum occidentale ssp. occidentale*	269–359	–
	basin wildrye	LECI4	*Leymus cinereus*	45–90	–
2	**Secondary Perennial Grasses**			45–90	

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	Indian ricegrass	ACHY	*Achnatherum hymenoides*	3–20	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	3–20	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	3–20	–
	squirreltail	ELEL5	*Elymus elymoides*	3–20	–
Forb					
3	**Perennial Forbs**			18–90	
Shrub/Vine					
4	**Primary Shrubs**			179–314	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	135–224	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	45–90	–
5	**Secondary Shrubs**			67–112	
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	7–20	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	7–20	–
	currant	RIBES	*Ribes*	7–20	–
	roundleaf snowberry	SYRO	*Symphoricarpos rotundifolius*	7–20	–
Tree					
6	**Evergreen**			34–56	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	13–67	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	7–27	–
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	7–27	–
	Jeffrey pine	PIJE	*Pinus jeffreyi*	7–20	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	7–20	–
	currant	RIBES	*Ribes*	7–17	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	7–17	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Western needlegrass has a spreading and deeply penetrating root system, which makes it resistant to trampling. Western needlegrass provides valuable forage for many species of wildlife. 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.

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:
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.

Other products

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.

Type locality

Location 1: Mono County, CA	
Township/Range/Section	T6N R24E S6
Latitude	38° 23′ 36″

Longitude	119° 25′ 23″
General legal description	Toiyabe National Forest, approximately .5 miles from the head of Burcham Creek.

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)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	07/18/2013
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. A few may be expected on steeper slopes in areas recently subjected to summer convection storms.

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2. **Presence of water flow patterns:** Waterflow patterns are none to rare. A few may be expected on steeper slopes in areas recently subjected to summer convection storms.

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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. Small terracettes may occur on steeper slopes.

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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 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

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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) mostly stays in place. It may be 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.

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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.

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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 fine granular. Soil surface colors are browns and soils are typified by a mollic epipedon. Organic matter of the surface 2 to 4 inches is typically 1 to 3 percent. 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. western needlegrass& basin wildrye]) 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 none. Subsoil argillic horizons are not to be interpreted as compaction.

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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: Deep-rooted, cool season, perennial bunchgrasses

    Sub-dominant: tall shrubs (mountain big sagebrush, antelope bitterbrush > deep-rooted, cool season, perennial forbs > associated shrubs > shallow-rooted, cool season perennial grasses > fibrous, shallow-rooted, cool season, perennial and annual forbs

    Other: evergreen trees

    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 may be common with standing dead shrub canopy material as much as 25% 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):** Reference Plant Community: Under cover and between plant interspaces (35-50%) 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 June) ± 600 lbs/ac; Favorable years ± 800 lbs/ac, Unfavorable years ± 400 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 include cheatgrass and annual mustards.

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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 extended or extreme drought conditions.
