USDA Natural Resources
Conservation Service

Ecological site R039XA143AZ
Cinder Cones 17-22"

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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): 039X–Mogollon Transition North

SITE FEATURES
Site is essentially without vegetation on the lower slopes of cinder cones. At the top and upper slopes, this site may have patchy communities of Ponderosa pine and Apache plume.

MLRA CHARACTERISTICS-THESE ARE GENERAL STATEMENTS
AZ 39.1 Mogollon Plateau Coniferous Forests

Elevations range from 7000 to 12,500 feet and precipitation averages 20 to 35 inches per year. Vegetation includes ponderosa pine, Gambel oak, Arizona walnut, sycamore, Douglas fir, blue spruce, Arizona fescue, sheep fescue, mountain muhly, muttongrass, junegrass, pine dropseed, and dryland sedges. The soil temperature regime ranges from mesic to frigid and the soil moisture regime ranges from typic ustic to udic ustic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin.

Associated sites

R039XA129AZ	**Clay Bottom 17-22"**
R039XA141AZ	**Cindery-Ashy Upland 17-22"**
R039XA142AZ	**Cinders-Lava Flow Upland 17-22"**

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	(1) *Fallugia paradoxa*
Herbaceous	Not specified

Physiographic features

This site occurs on cinder cones in the San Francisco Volcanic Field of Northern Arizona.

Table 2. Representative physiographic features

Landforms	(1) Cinder cone (2) Lava plain
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–2,286 m
Slope	2–15%
Water table depth	203 cm

Climatic features

The type location for this ecological site is on Sunset Crater National Monument near Flagstaff, Arizona. Average maximum temperature is 63.3 degrees F; average minimum temperature is 28.4 degrees F. The average total precipitation is 16.75 inches and it receives0.3 inches of snowfall on average.

Table 3. Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	
Precipitation total (average)	559 mm

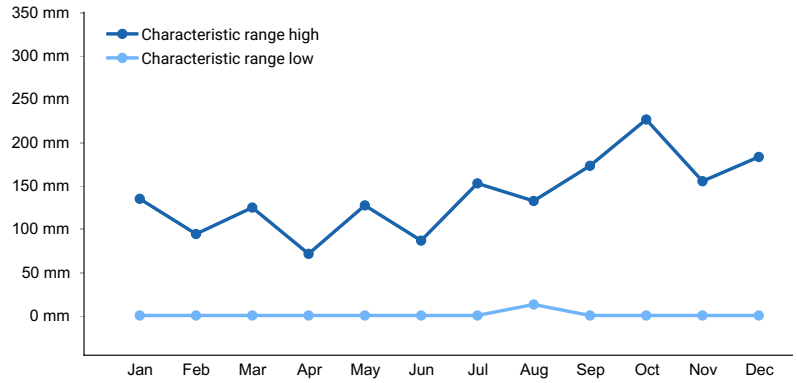


Figure 1. Monthly precipitation range

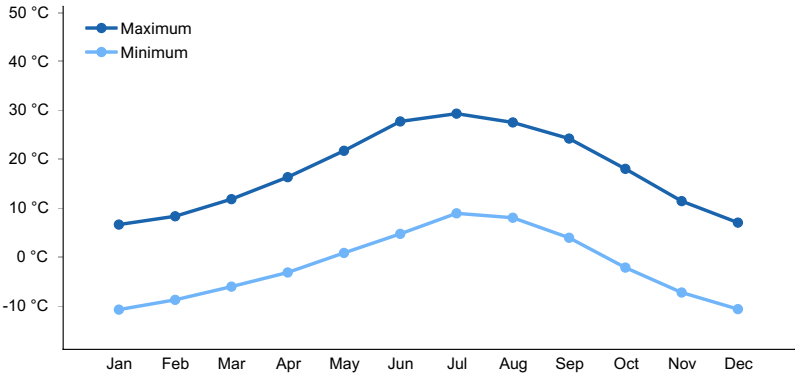


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no water features on this site.

Soil features

The soils of this site are composed primarily of volcanic ejecta and are of a relatively young age.

Mapunits on this site are decribed in Sunset Crater National Monument Soil Survey

MU 22-Cinderhill-lava flow complex, 2 to 15 percent slopes
MU 25-Kana'a-Cinderland complex, 1 to 15 percent slopes
MU 26-Kana'a-Cinderland complex, 15 to 60 percent slopes
MU 30-Sunsetcrater extremely gravelly loamy sand, 15 to 35 percent slopes

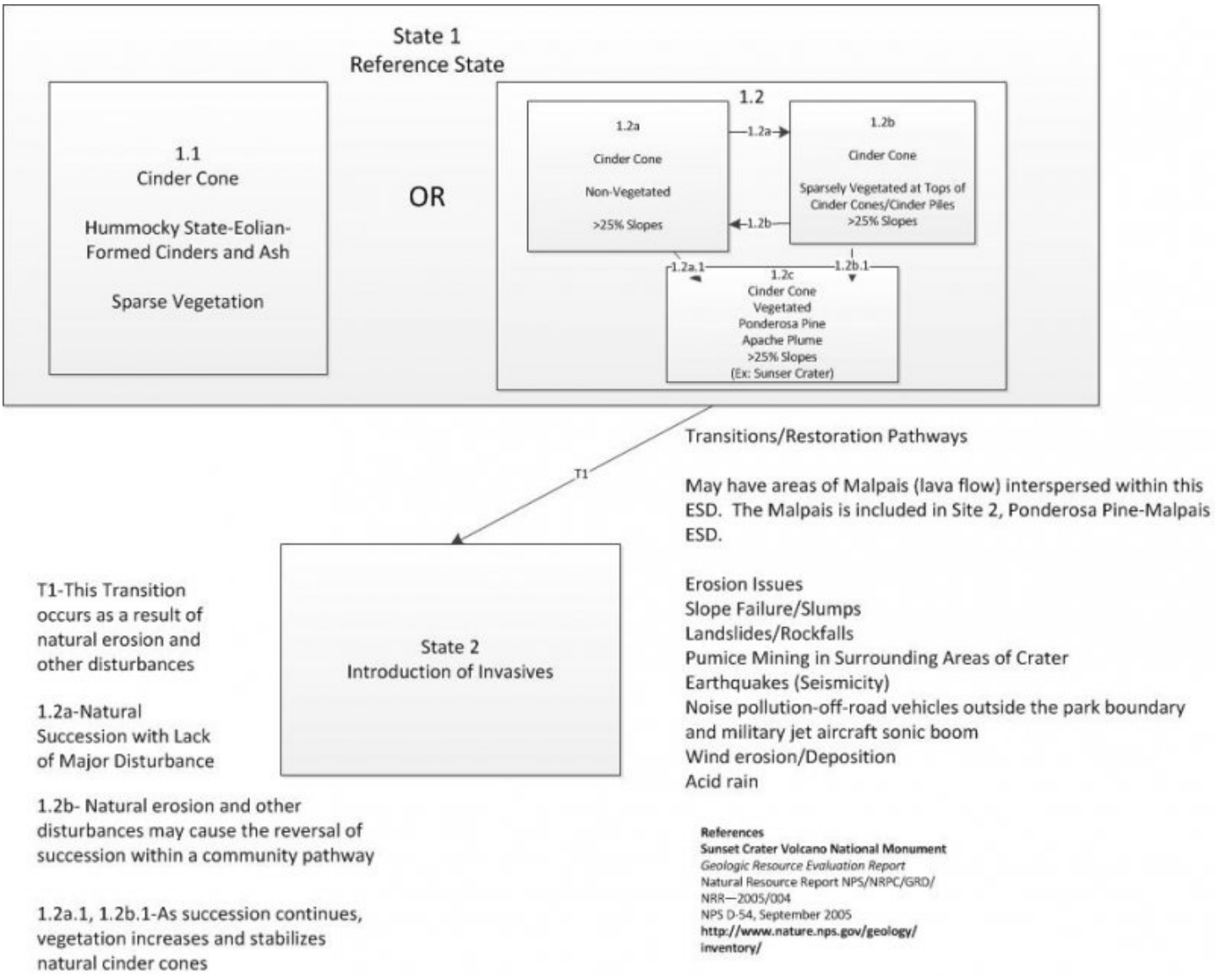
Table 4. Representative soil features

Parent material	(1) Tephra–basic volcanic breccia
Surface texture	(1) Very gravelly coarse sand
Drainage class	Excessively drained
Permeability class	Very rapid
Soil depth	152 cm
Surface fragment cover <=3"	100%
Available water capacity (0-101.6cm)	4.57 cm
Subsurface fragment volume <=3" (Depth not specified)	65%

Ecological dynamics

This site appears to be in early succession. Areas of sparsely vegetated to barren areas dominate the site. Areas of sparsely to non-vegetated Bonito lava flow may appear sporadically throughout. This site usually appears near the ecological site R039XA142AZ, Cinders-Lava Flow, within the San Francisco Volcanic Field.

State and transition model



State 1
Reference State

Community 1.1
Cinder Cone

This phase has <25% slopes and has a hummocky appearance. This phase is sparsely vegetated to non-vegetated.

Community 1.2
Non-Vegetated to Sparsely Vegetated Cinder Cones

This site is primarily bare cinders with occasional single grass,single forb, sparsely scattered shrubs or trees. Slopes are generally >25%.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	–	78	202
Forb	–	6	22
Grass/Grasslike	–	2	11
Total	**–**	**86**	**235**

Pathway 1
Community 1.1 to 1.2

Cinder Cone

Non-Vegetated to Sparsely Vegetated Cinder Cones

State 2
Introduction of Invasives

Community 2.1
Introduction of Invasives

Transition 2
State 1 to 2

Additional community tables

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Native Grasses**			0–6	
	Canada wildrye	ELCA4	*Elymus canadensis*	0–11	–
Forb					
2	**Annual Forb**			0–11	
	Newberry's twinpod	PHNE5	*Physaria newberryi*	0–11	–
Tree					
3	**Tree**			0–202	
	ponderosa pine	PIPO	*Pinus ponderosa*	0–202	–

Type locality

Location 1: Coconino County, AZ	
UTM zone	N
UTM northing	3913217
UTM easting	451491
General legal description	This type location is located on Sunset Crater National Monument with limited public access

Contributors

Jennifer Puttere

Approval

Scott Woodall, 4/06/2020

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)	Jennifer Puttere
Contact for lead author	Flagstaff, Arizona MLRA Soil Survey Office
Date	03/01/2012
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** No rills on this site. This area is extensively covered in volcanic cinders. These cinders stabilize the site and prevent rills.

2. **Presence of water flow patterns:** No water flow patterns on this site.

3. **Number and height of erosional pedestals or terracettes:** No erosional pedestals on this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 1 percent bare ground on this site; the majority of the site is covered in volcanic tephra

5. **Number of gullies and erosion associated with gullies:** No gullies on this site.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Some litter accumulation under sparse shrub vegetation as evidence of wind disturbance; no wind scouring or blowouts on this site.

7. **Amount of litter movement (describe size and distance expected to travel):** Very little litter present due to limited presence of vegetation; less than 1 inch in length and diameter and movement limited to the area immediately surrounding the leaf drop for the most part due to the [presence of volcanic cinders.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** This site is stable and able to support vegetation due to the presence of pea-sized cinders. Under the cinders, the soil is relatively young and undeveloped. Without the presence of cinders this soil would erode quickly.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Little to n
soil surface structure. This site is stabilized by the presence of volcanic cinders and ash.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site has high infiltration and low runoff due to the nearly continuous cover of porous cinders.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer 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: Bare ground>>forbs>shrubs>grasses

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** No significant problems with plant mortality on this site. The vegetation is widely scattered making dispersal of pathogens difficult.

14. **Average percent litter cover (%) and depth (in):** This site has limited vegetative litter cover due to sparse scattered vegetation.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** <100 lbs/acre total production would be expected on this site.

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:** No invasives currently on site. There is potential for dalmation toadflax to occur on the site but not to the extent of being a significant problem.

17. **Perennial plant reproductive capability:** Normal reproduction on site.