USDA Natural Resources
Conservation Service

Ecological site R039XA142AZ
Cinders-Lava Flow Upland 17-22"

Last updated: 4/06/2020
Accessed: 05/04/2024

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.

MLRA notes

Major Land Resource Area (MLRA): 039X–Mogollon Transition North

SITE FEATURES
This Ecological site occurs in MLRA 39.1, on the edge of the Mogollon Rim in northern Arizona. This site occurs in the San Francisco Volcanic field and is characterized by cinder cones and lava flows. The vegetation on this site is in early successional stages.

Soil temperature regime ranges from mesic to frigid
Soil moisture regime ranges from typic ustic to udic ustic

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 in the San Francisco Volcanic Field on the edge of the Mogollon Rim/Colorado Plateau Region of northern Arizona. This site is dominated by volcanic cinders on upland sites below cindercones (R039XA143AZ). This site is interspersed with patchy lava flows from the Sunset Crater eruption.

Table 2. Representative physiographic features

Landforms	(1) Cinder cone (2) Lava plain
Elevation	2,103–2,450 m

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 receives 60.3 inches of snowfall on average.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	
Precipitation total (average)	254 mm

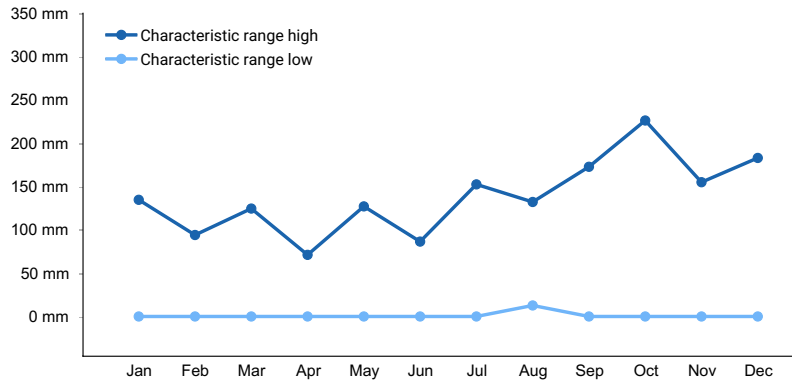


Figure 1. Monthly precipitation range

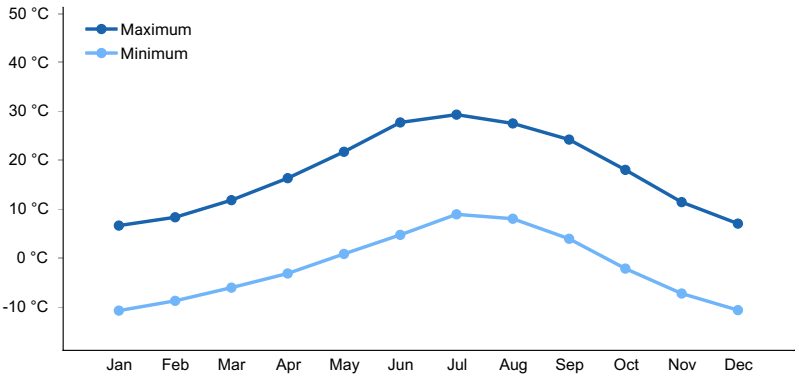


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

No influencing water features on this site.

Soil features

The soils on this site are formed of the relatively young parent material from the eruption of Sunset Crater. Soils on this site are not well-developed, but have increased stability and vegetation potential due to the presence of cinders

on the surface.

Mapunits associated with this site are presented in detail in the Sunset Crater National Monument Soil Survey

MU 28 - Lithic Ustorthents-Blackash-Lava flows complex, 2 to 15 percent slopes
MU 27 - Lava flows-Lithic Haplofibrists complex, 2 to 15 percent slopes

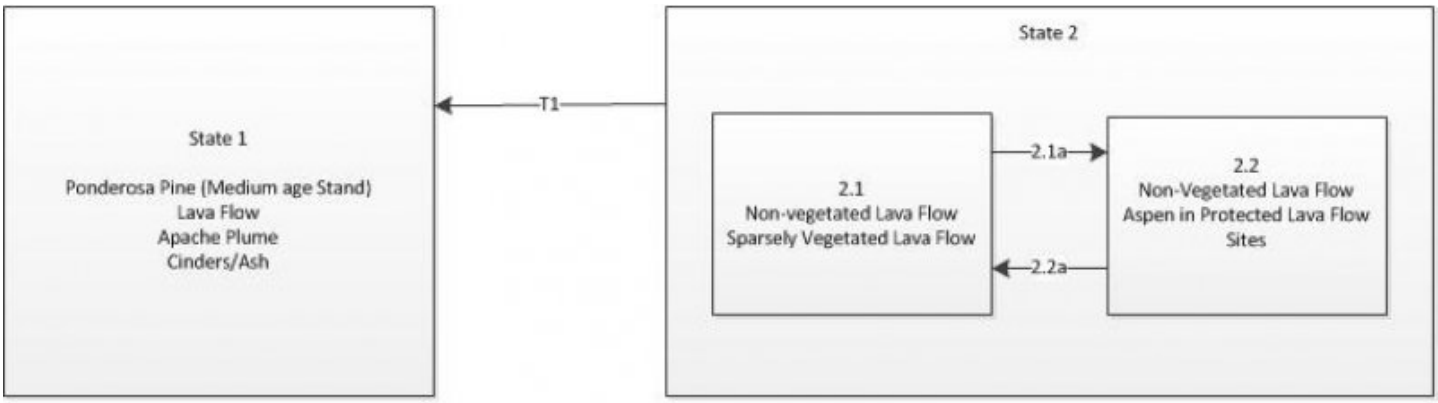
Table 4. Representative soil features

Parent material	(1) Tephra–pyroclastic rock
Surface texture	(1) Very gravelly loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	10 cm

Ecological dynamics

The type location for this site is located on Sunset Crater National Monument in northern Arizona. This site is characterized by ash and cinders with Ponderosa Pine and Apache Plume. There are scattered patterns of lava flow throughout the site. The lava flow is either non-vegetated or may have sparse vegetation of aspen in protected sites. Occasionally shrubs such as Wax Currant and Apache Plume occur in pockets of weathered herbaceous litter within the lava flows.

State and transition model



When State 2 weathers into soil from solid lava flow, it will proceed to the Ponderosa Pine/Apache Plume Successional State. State 1 and weathered State 2 will then proceed to succeed to a new, unknown state as time, weather, and other disturbance allow. The volcanic eruption has been too recent to allow for more succession.

T1 – Weathering, time

2.1a – Litter accumulation to Allow For Seedling Germination; weather, time

2.2a-Disturbance from Environmental Factors; Native Ungulates feeding on aspen suckers; loss of organic materials and reduced litter accumulation; weather events

State 1
Reference State

This state is characterized by ash and cinders with Ponderosa Pine and Apache Plume. There are scattered patterns of lava flow throughout the site. The lava flow is either non-vegetated or may have sparse vegetation of aspen in protected sites. Occasionally shrubs such as Wax Currant and Apache Plume occur in pockets of weathered herbaceous litter within the lava flows.

Community 1.1
Ponderosa Pine-Lava Flow

This site is characterized by ash and cinders with Ponderosa Pine and Apache Plume. There are scattered patterns of lava flow throughout the site.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	22	347	673
Grass/Grasslike	6	56	112
Shrub/Vine	6	28	56
Forb	6	8	11
Total	**40**	**439**	**852**

State 2
Lava Flow

This state occurs as a result of lava flow from the base of cinder cones. These areas have little to no vegetation, although may occasionally have aspen trees and other shrubs growing in cracks in which organic matter and litter has accumulated.

Community 2.1
Non-Vegetated Lava Flow

This site is solid basaltic lava flow; non-vegetated except in litter "pockets" able to collect moisture and organic matter.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	17	22	56
Total	**17**	**22**	**56**

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	0-4%	–	–
>0.3 <= 0.6	–	0-4%	–	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 2.2
Sparsely Vegetated Lava Flow

This site is basaltic lava flow with sparse vegetation growing in the cracks where organic matter and partially decomposed herbaceous litter has accumulated. There may also be aspen trees growing in these sheltered areas of increased water accumulation and cooler temperatures.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	22	34	56
Total	**22**	**34**	**56**

Additional community tables

Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			17–56	
	Apache plume	FAPA	*Fallugia paradoxa*	17–34	–
	wax currant	RICE	*Ribes cereum*	17–22	–

Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrub**			17–56	
	Apache plume	FAPA	*Fallugia paradoxa*	17–34	–
	wax currant	RICE	*Ribes cereum*	17–22	–

Type locality

Location 1: Coconino County, AZ	
UTM zone	N
UTM northing	3913147
UTM easting	452526
General legal description	This type location is located on Sunset Crater National Monument and has 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 MLRA Soil Survey Office
Date	10/17/2011
Approved by	Scott Woodall
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** None

3. **Number and height of erosional pedestals or terracettes:** Slight mounding around bases of shrubs of cinders where there has been slight water disturbance

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** None

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Litter is expected to move no more thar 1 foot from the origination point. There is extensive protection on this site by the presence of cinders. This prevents wind erosion and water flow disturbance which may cause litter to move from its point of origin.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** First few millimeters of soil surface is covered in cinders or solid basaltic lava flow.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Weak platy soil surface structure; low soil organic matter

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Although the vegetation is sparse in this area, there are extensive cinders from a volcanic eruption which cover the soil surface

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: Shrubs>>trees

    Sub-dominant:

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Low mortality and decadence on this site; in drought years the ponderosa pines may show signs of water stress and plants within the lava flows may not survive. no evidence of this at this time.

---

14. **Average percent litter cover (%) and depth (in):** Litter cover on this site is very low. Litter may move by wind or water and accumulate under shrubs and be caught in the unweathered lava flows.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** <200 pounds per acre on the cinder sites; <100 pounds per acre on the lava flow sites.

---

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 on this site.

---

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