USDA Natural Resources
Conservation Service

Ecological site F039XA132AZ
Cinder Upland 17-22" p.z. (QUGA, PIPO)

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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

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.

Table 1. Dominant plant species

Tree	(1) *Quercus gambelii* (2) *Pinus ponderosa*
Shrub	(1) *Robinia neomexicana*
Herbaceous	(1) *Muhlenbergia montana* (2) *Festuca arizonica*

Physiographic features

This soil is mapped on fans below and around cinder cones. The surface of the soils associated with this site are littered with cinders. Cinders in the soil profile affect the plant-soil-moisture relationship. The site does not significantly benefit from run-on moisture.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Elevation	6,000–8,000 ft
Slope	2–15%

Climatic features

About 40% of the moisture in this Common Resource Area (CRA), or Land Resource Unit (LRU) comes as rain from June to September. The remainder comes from October to May as snow or light rain. Extreme temperatures of 97 and -37 degrees Fahrenheit have been recorded. Some moisture is usually received every month.

Table 3. Representative climatic features

Frost-free period (average)	168 days
Freeze-free period (average)	120 days
Precipitation total (average)	22 in

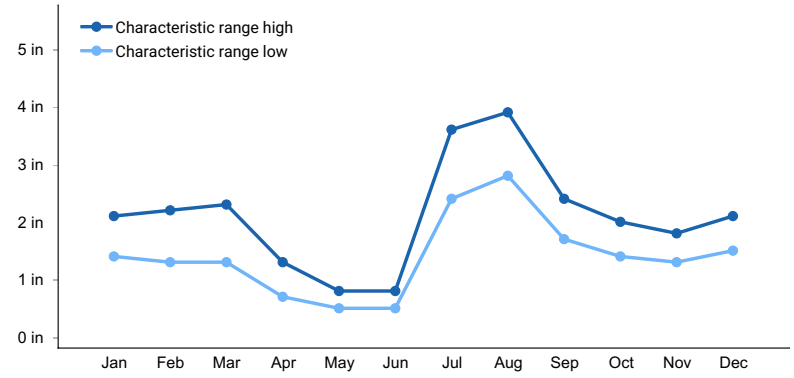


Figure 1. Monthly precipitation range

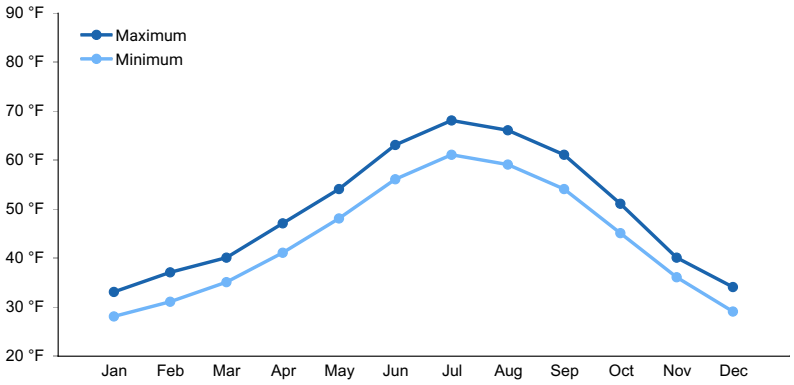


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils characterizing this site are moderately deep to very deep. The surface is 1 to 5 inches deep and is of low to moderte susceptibility to erosion. The subsoil and underlying layers have slow to moderately slow permeability and are well drained. This site can absorb all the moisture the climate can provide.
Soils mapped to this site include: from SSA-695 Kaibab NF area MU's 8-Mento family very gravelly loam & 14-Sampson family gravelly loam.

Table 4. Representative soil features

Surface texture	(1) Very gravelly silt loam (2) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	20–70 in
Available water capacity (0-40in)	0.01–0.21 in
Calcium carbonate equivalent (0-40in)	0–1%

Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.4–7.8

Ecological dynamics

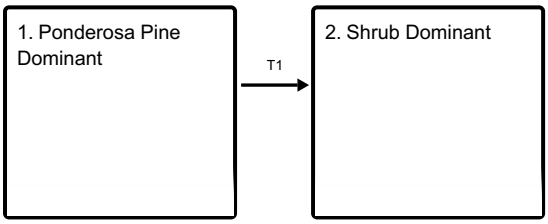
The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The historical climax plant community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as grazing, fire, or drought.

Production data provided in this site description is standardized to air-dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

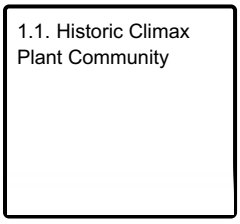
NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity Index, compare the production (air-dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Ponderosa Pine Dominant

Ponderosa Pine dominant with isolated mature stands of gambel oak and other shrubs. This state is also dominant in cool-season bunchgrasses.

Community 1.1
Historic Climax Plant Community

The plant community of this site is a mixed ponderosa pine, Gambel oak forest with an understory of grasses, forbs

and shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	300	350	400
Tree	75	87	100
Shrub/Vine	0	12	25
Forb	5	10	15
Total	**380**	**459**	**540**

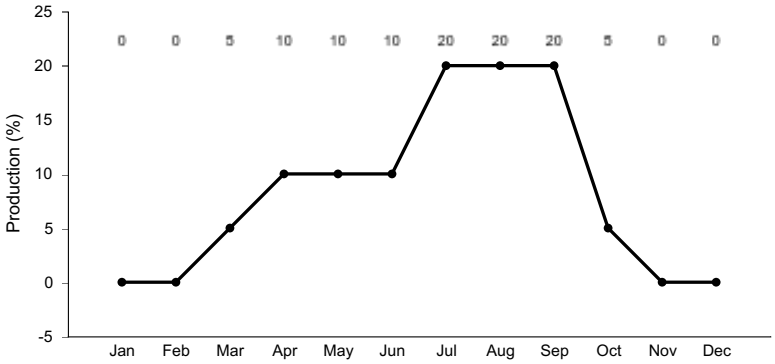


Figure 4. Plant community growth curve (percent production by month). AZ3911, 39.1 17-22" p.z. all sites. Growth begins in the spring, most growth occurs during the summer rainy season..

State 2
Shrub Dominant

Shrub dominant with immature stands of gambel oak and other shrubs. There is less grass than State 1.

Transition T1
State 1 to 2

A severe, crown burning fire will take out the Ponderosa Pine and increase basal sprouting shrubs. The ecological processes for transition back to state one are not understood at this time.

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	**Cool Season Grasses**			280–365	
	Arizona fescue	FEAR2	*Festuca arizonica*	75–100	–
	mountain muhly	MUMO	*Muhlenbergia montana*	75–100	–
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	25–50	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	30–40	–
	Ross' sedge	CARO5	*Carex rossii*	20–30	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	5–10	–
	Canada bluegrass	POCO	*Poa compressa*	5–10	–
	deergrass	MURI2	*Muhlenbergia rigens*	5–10	–
	black dropseed	SPIN5	*Sporobolus interruptus*	5–10	

	black dropseed	SPINJ	*Sporobolus interruptus*	5–10	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	0–5	–
	muttongrass	POFE	*Poa fendleriana*	0–5	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–5	–
	nodding brome	BRAN	*Bromus anomalus*	0–5	–
2	**Warm Season Grasses**			20–35	
	blue grama	BOGR2	*Bouteloua gracilis*	15–25	–
	little bluestem	SCSC	*Schizachyrium scoparium*	5–10	–
Forb					
3	**Forbs**			25–75	
	iris	IRIS	*Iris*	10–25	–
	trefoil	LOTUS	*Lotus*	0–5	–
	lupine	LUPIN	*Lupinus*	0–5	–
	beardtongue	PENST	*Penstemon*	0–5	–
	dock	RUMEX	*Rumex*	0–5	–
	vetch	VICIA	*Vicia*	0–5	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–5	–
	weakleaf bur ragweed	AMCO3	*Ambrosia confertiflora*	0–5	–
	pussytoes	ANTEN	*Antennaria*	0–5	–
	sandwort	ARENA	*Arenaria*	0–5	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–5	–
	aster	ASTER	*Aster*	0–5	–
	milkvetch	ASTRA	*Astragalus*	0–5	–
	thistle	CIRSI	*Cirsium*	0–5	–
	redroot buckwheat	ERRA3	*Eriogonum racemosum*	0–5	–
	spurge	EUPHO	*Euphorbia*	0–5	–
	gilia	GILIA	*Gilia*	0–5	–
	pingue rubberweed	HYRI	*Hymenoxys richardsonii*	0–5	–
Shrub/Vine					
4	**Shrubs**			0–25	
	New Mexico locust	RONE	*Robinia neomexicana*	5–15	–
	Woods' rose	ROWO	*Rosa woodsii*	0–5	–
	Fendler's ceanothus	CEFE	*Ceanothus fendleri*	0–5	–
Tree					
5	**Trees**			75–100	
	Gambel oak	QUGA	*Quercus gambelii*	50–60	–
	ponderosa pine	PIPO	*Pinus ponderosa*	15–25	–
	alligator juniper	JUDE2	*Juniperus deppeana*	5–15	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	0–5	–

Animal community

Suitability for grazing by livestock is good before canopy exceeds 50%. Cattle, sheep, goats and horses can use this site in summer and early fall. Management considerations include use of Prescribed Grazing, water developments and reseeding grass following harvest operations for forage and to reduce erosion, grazing should

not damage young trees.
Site factors affecting wildlife:
Water: Frequently found in scattered natural wetlands and springs.
Cover: good for most species.
Food: Good potential except where grazing is unmanaged.
Other: Snowfall causes shifts in wildlife populations.

Recreational uses

Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists.

Activities include hunting, cross-country riding, photography, hiking, and wildlife observation.

Wood products

Under development.

Contributors

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Approval

Scott Woodall, 9/05/2019

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):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

    Sub-dominant:

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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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:**