USDA Natural Resources
Conservation Service

Ecological site R039XA131AZ
Loamy Bottom 17-22" p.z. Subirrigated

Last updated: 4/06/2020
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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.

Associated sites

F039XA133AZ	**Basalt Upland 17-22" p.z. (PIPO)**
R039XA130AZ	**Loamy Bottom 17-22" p.z.**
R039XA137AZ	**Loamy Upland 17-22" p.z. Subirrigated**

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa*
Shrub	(1) *Ericameria nauseosa ssp. nauseosa var. glabrata* (2) *Iris*
Herbaceous	(1) *Juncus* (2) *Carex*

Physiographic features

This site occurs on valley floors in narrow to broad drainageways. The site does benefit from run-on moisture from adjacent areas and from a shallow water table.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)

Ponding frequency	Occasional to frequent
Elevation	6,000–8,000 ft
Slope	0–2%
Ponding depth	0 in
Water table depth	0–5 in
Aspect	Aspect is not a significant factor

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

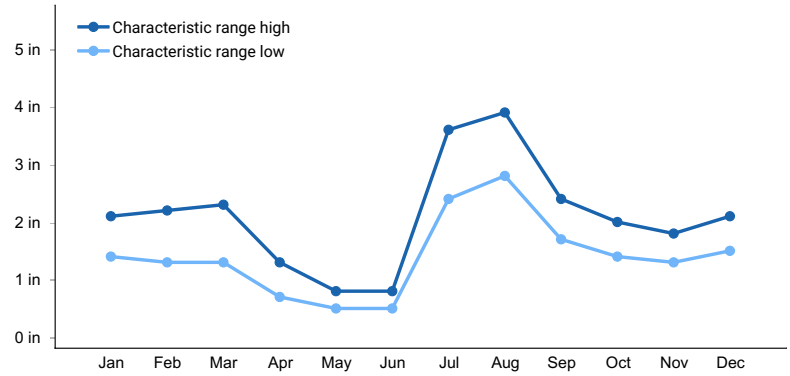


Figure 1. Monthly precipitation range

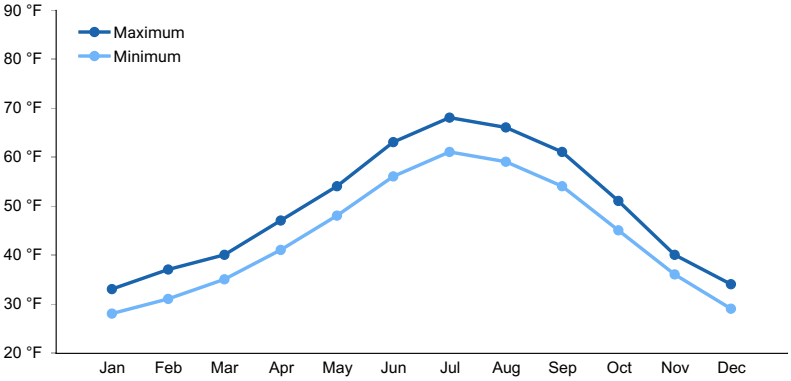


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

The soils on this site are hydric.

Soil features

The soils characterizing this site are deep. The surface soil is about 3 inches deep and is minimally susceptible to erosion, textures include Loam with an organic mat. The subsoil and underlying layers textures include very stony loam and extremely stony clay loam and have a moderately slow permeability rate. This site can absorb all the

moisture the climate can provide.
Typical taxonomic units include: SSA 695 Kaibab National Forest - MU 3 Oxley family.

Table 4. Representative soil features

Surface texture	(1) Loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Moderately slow to slow
Soil depth	40–60 in
Surface fragment cover <=3"	40–55%
Available water capacity (0-40in)	0.08–0.11 in
Calcium carbonate equivalent (0-40in)	10–15%
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
Subsurface fragment volume >3" (Depth not specified)	40–55%

Ecological dynamics

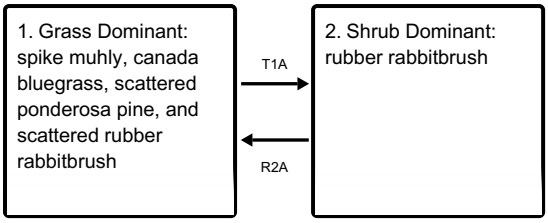
The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The historical climax plant community represents the natural potential plant communities found on relict or 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.

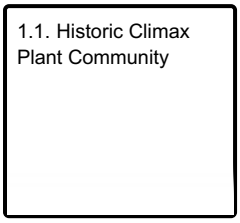
NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine 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
Grass Dominant: spike muhly, canada bluegrass, scattered ponderosa pine, and scattered rubber rabbitbrush

This state is grass dominant with scattered trees and shrubs.

Community 1.1
Historic Climax Plant Community

The historic climax plant community of this site is dominated by a variety of grasses and forbs.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	720	740	760
Forb	40	60	80
Shrub/Vine	0	8	16
Tree	0	4	8
Total	**760**	**812**	**864**

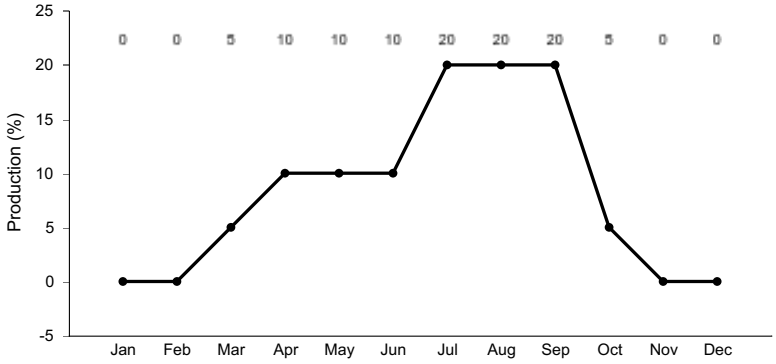


Figure 4. Plant community growth curve (percent production by month). AZ3911, 39.1 17-22" p.z. all sites. Growth begins in the spring, most growth occurs during the summer rainy season..

State 2
Shrub Dominant: rubber rabbitbrush

This state shows a decrease in grass and an increase in rubber rabbitbrush.

Transition T1A
State 1 to 2

Excessive disturbance such as periodic fire, ground disturbing recreation, and continuous, season-long grazing will cause a threshold to be crossed to a rubber rabbitbrush state.

Restoration pathway R2A
State 2 to 1

An increase in soil organic carbon and a decrease in bare ground will help restore the system.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Tree					
0				0–6	
	ponderosa pine	PIPO	*Pinus ponderosa*	0–6	–
Shrub/Vine					
0				0–30	
	rubber rabbitbrush	ERNAG	*Ericameria nauseosa ssp. nauseosa var. glabrata*	0–13	–
	pingue rubberweed	HYRI	*Hymenoxys richardsonii*	0–13	–
	Woods' rose	ROWOW	*Rosa woodsii var. woodsii*	0–6	–
3				6–25	
	aster	ASTER	*Aster*	6–13	–
	cinquefoil	POTEN	*Potentilla*	0–6	–
	sandwort	ARENA	*Arenaria*	0–6	–
Grass/Grasslike					
0				150–375	
	spike muhly	MUWR	*Muhlenbergia wrightii*	98–195	–
	deergrass	MURI2	*Muhlenbergia rigens*	32–65	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–32	–
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	0–32	–
	Ross' sedge	CARO5	*Carex rossii*	6–20	–
	rush	JUNCU	*Juncus*	6–20	–
	Grass, annual	2GA	*Grass, annual*	6–13	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–6	–
	nodding brome	BRAN	*Bromus anomalus*	0–6	–
1				115–240	
	Canada bluegrass	POCO	*Poa compressa*	98–162	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	6–20	–
	western wheatgrass	PASM	*Pascopyrum smithii*	6–20	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	6–13	–
	Arizona fescue	FEAR2	*Festuca arizonica*	0–6	–

	[illegible]	[illegible]	[illegible]	[illegible]	
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–6	–
	muttongrass	POFE	*Poa fendleriana*	0–6	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–6	–
2				10–65	
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–32	–
	blue grama	BOGR2	*Bouteloua gracilis*	8–20	–
	tufted hairgrass	DECE	*Deschampsia cespitosa*	0–13	–
Forb					
0				25–105	
	iris	IRIS	*Iris*	6–13	–
	Lewis flax	LILE3	*Linum lewisii*	6–13	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	6–13	–
	pussytoes	ANTEN	*Antennaria*	6–13	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–6	–
	milkvetch	ASTRA	*Astragalus*	0–6	–
	thistle	CIRSI	*Cirsium*	0–6	–
	horsetail	EQUIS	*Equisetum*	0–6	–
	redroot buckwheat	ERRA3	*Eriogonum racemosum*	0–6	–
	strawberry	FRAGA	*Fragaria*	0–6	–
	lupine	LUPIN	*Lupinus*	0–6	–
	dock	RUMEX	*Rumex*	0–6	–

Type locality

Location 1: Coconino County, AZ	
Township/Range/Section	T21N R5E S12
General legal description	Belmont AZ Quad, NW1/4, NW1/4, Section 12, T21N, R5E, Cononino County, AZ.

Contributors

Larry D. Ellicott
Larry JD. Ellicott
Steve Barker

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)	
Contact for lead author	
Date	05/11/2025
Approved by	Scott Woodall
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:

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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):**

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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:**

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17. **Perennial plant reproductive capability:**
