USDA Natural Resources
Conservation Service

Ecological site R039XA013NM
Mountain Malpais

Accessed: 05/12/2025

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.

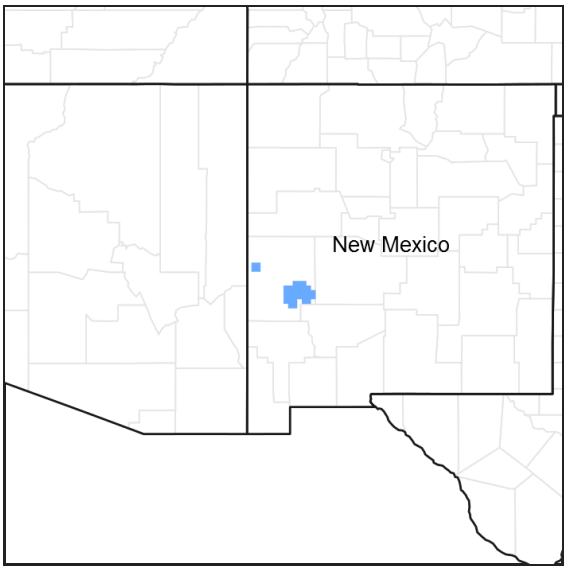


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on variable terrain that ranges from gently sloping to steep. Exposures are variable. Basalt outcroppings are common; also, stony or rocky soils are common. Slopes vary from 0 to 40 percent. Elevations go to over 9,000 feet but are typically between 7,000 to 8,500 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Lava flow (2) Lava plain
Elevation	7,000–9,000 ft
Slope	0–40%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation varies from approximately 16 to 20 inches, depending upon where the site is found. Year-to-year fluctuations in precipitation are common. Half or more of the precipitation occurs during the late-fall through early spring periods, often in the form of snow. The balance of the precipitation falls typically from mid-June through September and is characterized by short-duration, high-intensity thunderstorms.

The average frost-free season is about 103 days but is highly variable from location to location. The last killing frost in the spring occurs about June 1st, and the first killing frost in the fall normally occurs by October 1st. Lighter frosts may occur anytime in June and again in late August or early September. Average annual air temperature is about 50 degrees F. Monthly average air temperatures vary from 30 degrees F in January to just under 70 degrees F in August.

Both the air temperature and moisture regimes of this climate favor cool-season vegetation.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F, respectively.

Table 3. Representative climatic features

Frost-free period (average)	112 days
Freeze-free period (average)	133 days
Precipitation total (average)	20 in

Influencing water features

This site is not influenced by water from a wetland or stream.

Soil features

Surface textures are characteristically stony, cobbly, gravelly, or clay loams. The soils are very shallow to shallow over basalt, with pockets of deeper soils that are stony or cobbly throughout. Soil-moisture relationships are good, and soil temperatures may be slightly higher than on associated soils due to darker color. Available water-holding capacity is very low to low while permeability is moderately slow to slow.

Table 4. Representative soil features

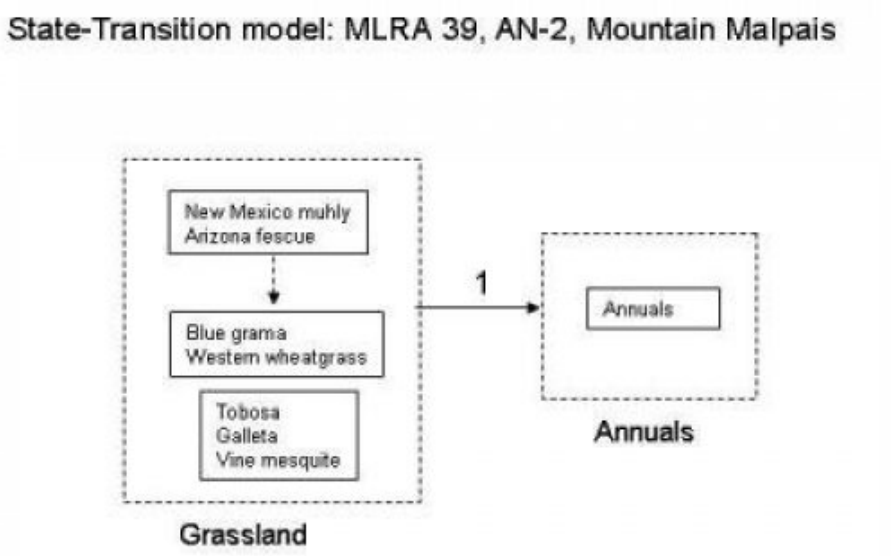
Surface texture	(1) Gravelly loam (2) Cobbly (3) Stony
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	10–20 in
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	15–35%
Available water capacity (0-40in)	0–6 in
Soil reaction (1:1 water) (0-40in)	6.6–7.3
Subsurface fragment volume <=3" (Depth not specified)	15–35%

Subsurface fragment volume >3" (Depth not specified)	15–35%

Ecological dynamics

To be added.

State and transition model



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

This is an open grassland site that is typically all but free of trees and large shrubs, although on steeper, north-facing slopes scattered juniper, oaks, and ponderosa pine may occur. Forbs include wildbuckwheat, trailing fleabane, and Indian paintbrush. Tree canopy normally does not exceed 10 percent, even on the north slopes, and average 5 percent or less. Other grasses may include: pine dropseed, threeawn spp., muhlenbergia spp., western wheatgrass, and bromes. Other shrubs may include broom snakeweed and fringed sagewort.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	553	723	893
Forb	52	68	84
Total	**605**	**791**	**977**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	12%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	28%

Figure 5. Plant community growth curve (percent production by month). NM1303, R039XA013NM Mountain Malpais HCPC. R039XA013NM Mountain Malpais HCPC Open grassland with scattered shrubs and forbs. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	5	10	10	25	30	12	5	0	0

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				128–213	
	mountain muhly	MUMO	*Muhlenbergia montana*	128–213	–
	New Mexico muhly	MUPA2	*Muhlenbergia pauciflora*	128–213	–
2				128–213	
	Arizona fescue	FEAR2	*Festuca arizonica*	128–213	–
3				43–128	
	muttongrass	POFE	*Poa fendleriana*	43–128	–
4				26–68	
	spike muhly	MUWR	*Muhlenbergia wrightii*	26–68	–
5				43–85	
	prairie Junegrass	KOMA	*Koeleria macrantha*	43–85	–
6				9–43	
	squirreltail	ELEL5	*Elymus elymoides*	9–43	–
7				43–128	

	big bluestem	ANGE	*Andropogon gerardii*	43–128	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	43–128	–
	little bluestem	SCSC	*Schizachyrium scoparium*	43–128	–
8				26–68	
	blue grama	BOGR2	*Bouteloua gracilis*	26–68	–
	needle and thread	HECO26	*Hesperostipa comata*	26–68	–
	common wolfstail	LYPH	*Lycurus phleoides*	26–68	–
9				26–68	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	26–68	–
Forb					
10				26–68	
	Forb, perennial	2FP	*Forb, perennial*	26–68	–
11				9–43	
	Forb, annual	2FA	*Forb, annual*	9–43	–
Shrub/Vine					
12				9–43	
	Apache plume	FAPA	*Fallugia paradoxa*	9–43	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	9–43	–
	oak	QUERC	*Quercus*	9–43	–
	skunkbush sumac	RHTR	*Rhus trilobata*	9–43	–
	wax currant	RICE	*Ribes cereum*	9–43	–
13				26–68	
	juniper	JUNIP	*Juniperus*	26–68	–
	twoneedle pinyon	PIED	*Pinus edulis*	26–68	–
	ponderosa pine	PIPO	*Pinus ponderosa*	26–68	–
14				9–26	
	Shrub, deciduous	2SD	*Shrub, deciduous*	9–26	–

Animal community

Habitat for Wildlife: This site provides habitats which support a resident animal community that is characterized by deer, bobcat, eastern cottontail, cliff chipmunk, thirteen-line ground squirrel, rock squirrel, Botta’s pocket gopher, white-throated woodrat, mourning dove, horned lark, meadowlark, chipping sparrow, tiger salamander, Chihuahua whiptail, and black-tailed rattlesnake.

Elk range into the site.

Where the site is associated with rock cliffs, boulders, and ledges, ringtail and canyon mouse occur and golden eagle, prairie falcon, great horned owl, common raven, white-throated swift, and violet-green swallow hunt over the site.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series----------Hydrologic Group

Adman----------D
Adobe----------D

Recreational uses

This site offers recreation potential for picnicking, hiking, horseback riding, nature observation, and photography. Camping opportunities can be good, but terrain and stony or rocky surfaces may limit choices of sites. Hunting is somewhat limited although both deer and elk may use the site. Natural beauty is largely tied to the mountainous setting in which the site occurs.

Wood products

The site has very little potential for wood products. What few tree and large shrub species exist probably should not be harvested unless a substantial increase in their numbers takes place as the result of a decline in condition.

Other products

Grazing:
Approximately 85 percent of the annual vegetative production on this site comes from plant species that produce forage for grazing animals, including domestic livestock. Achieving acceptable grazing distribution can sometimes be a problem due to steep topography and stony surfaces. Continuous grazing use in the same season, year after year, is not recommended, as a decline in the better forage species may result. Continued heavy use will almost certainly result in such a decline, and cool-season species such as Arizona fescue are usually the first to go. Blue grama has a tendency to increase under such circumstances, as will annual forbs and certain half-shrubs and shrubs. A system of deferred grazing that varies the season of use, year to year, is needed to maintain a healthy balance of vigorous plants on the site. Rest during late spring is particularly helpful to cool-season grasses while summer rest helps to promote warm-season species such as the muhlys and bluestems. Deer, elk, small mammals, and birds also use the site, in addition to domestic livestock.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index----------Ac/AUM
100 - 76----------2.5 – 3.2
75 – 51----------3.0 – 4.0
50 – 26----------3.7 – 5.5
25 – 0----------5.5+

Type locality

Location 1: Catron County, NM
Location 2: Grant County, NM
Location 3: Sierra County, NM
Location 4: Socorro County, NM

Other references

Data collection for this site was done in conjunction with the progressive soil surveys within the Arizona and New Mexico Mountains, Major Land Resource Area 39, of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: Socorro, Catron, Sierra, and Grant.

Characteristic Soils Are:
Adman, Adobe

Contributors

Brandon Bestelmeyer
Don Sylvester
Elizabeth Wright
John Tunberg
Michael Carpinelli

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):**

---

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:

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

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

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:**