

Ecological site R070AY010NM

Malpais Breaks

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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.

Ecological site concept

This site occurs on basalt-capped escarpments. Soils have high fragment content in surface layers, and are quite variable in depth. This site correlates to the Upland ecological site group.

Table 1. Dominant plant species

Tree	(1) <i>Juniperus</i>
Shrub	(1) <i>Quercus gambelii</i> (2) <i>Cercocarpus montanus</i>
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Bouteloua gracilis</i>

Physiographic features

This site is on steep to very steep sides of basalt-capped mesas. These soils are on alluvial fans and valley sideslopes. It consists of a series of ridges, benches and escarpments. The site is 20 to 35 percent basalt, sandstone and limestone outcrop and 65 to 80 percent soil. The soil is on fans and benches. This site is on all aspects. Areas with north and east aspects have greater density of vegetation. Elevation differences range from 100 to 800 feet. Elevation ranges from 4,900 to 8,200 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Escarpment (3) Scarp slope
Flooding frequency	None
Ponding frequency	None
Elevation	1,490 – 2,500 m

Slope	10 – 40 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area can be classified as “semi-arid continental”.

Precipitation averages 14 to 16 inches. Seventy seven percent of the year's moisture normally falls during the period of May through October. Practically all of it is brought by brief afternoon and evening thunderstorms. In July and August, normally the wettest months of the year, one can expect about one day in five when rainfall exceeds one-tenth inch. Early spring precipitation in May benefits the cool-season plants. Winter precipitation, supplying 24 percent of the year's moisture, normally has no more than two days a month with as much as one-tenth inch of moisture. Much of the winter precipitation falls as snow.

Air temperatures vary from a monthly mean of 20 degrees F in January to 69 degrees F in July. Daily high temperatures average in the 80's and low 90's during the summer. Winter low temperatures fall below the freezing mark much of the time from November through March with minimum temperatures approaching 25 degrees F below zero. Dates of the last killing frost may vary from May 9th through May 17th, and the first killing frost from September 27th to October 8th. The frost-free season ranges from 141 days to 153 days from early May to early October.

Wind velocities for the area average 10 to 12 miles per hour and prevail from the south and southwest. Generally, March is the windiest month. Strong winds during the spring cause rapid drying of the soil surface.

Nearby mountains to the west intercept much of the precipitation from the Pacific storms coming through this area during the winter. About 70 percent of the 14 to 16 inches of annual precipitation falls in the form of rainfall during the frost-free season. About 40 percent of the annual precipitation benefits cool-season plants, 50 percent benefits warm-season plants and 10 percent falls during the season of plant dormancy. Relative humidity is moderately low. The sun shines approximately 75 percent of the time.

Climate data was obtained from <http://www.wrcc.sage.dri.edu/summary/climsmnm.html> web site using 50 percent 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)	150 days
Freeze-free period (average)	170 days
Precipitation total (average)	410 mm

Influencing water features

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

Soil features

Soils are shallow to deep. Surface textures are very stony loam, very cobbly loam or very stony silty clay with clay content of 18 to 35 percent and rock fragments, dominantly cobbles and stones. Subsoil textures range from very stony sandy clay loam, silt loam, very stony loam, or very stony clay loam with rock fragment dominantly stones and cobbles. Visible calcium carbonate in the form of coatings on rock fragments. Permeability is moderate to very slow. Available water-holding capacity is low to high. Effective rooting depth is 10 to more than 60 inches. These soils generally have air-water relationships beneficial to plant growth. However, some of the shallow stony soils are droughty. These soils are not usually classified to the series or family level because of variability.

Minimum and maximum values listed below represent the characteristic soils for this site.

Characteristic soils

Table 4. Representative soil features

Surface texture	(1) Extremely stony loam (2) Very cobbly loam (3) Very stony silty clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderate
Soil depth	30 – 180 cm
Surface fragment cover $\leq 3"$	10 – 30 %
Surface fragment cover $> 3"$	40 – 50 %
Available water capacity (0-101.6cm)	7.62 – 30.48 cm
Calcium carbonate equivalent (0-101.6cm)	20 – 50 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10
Subsurface fragment volume $\leq 3"$ (Depth not specified)	10 – 20 %

Subsurface fragment volume >3" (Depth not specified)	40 – 60 %
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Ecological dynamics

Text from the Grazing Section that is relevant to plant ecology:

Approximately 80 percent of the total annual yield are from species that furnish forage for grazing animals. Continuous grazing during the growing season will cause the more desirable forage plants such as little bluestem, big bluestem, sideoats grama, western wheatgrass, and mountain mahogany to decrease. Species most likely to increase are blue grama, threeawn, oneseed juniper, broom snakeweed, oak brush, and cholla cactus. Rest during April, May and June benefits needle and thread, New Mexico feathergrass, and Indian ricegrass. Rest during late spring and early summer is beneficial to species such as big bluestem and switchgrass.

State and transition model

Figure 3. Generalized STM for upland sites in 70A. Note that

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				168-230	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	173-230	–
2				168-230	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	173-230	–
3				56-112	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	57-115	–
4				56-112	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	57-115	–
5				56-112	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	57-115	–
6				34-56	
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	35-57	–
7				34-56	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	35-57	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	35-57	–
8				34-56	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	35-57	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	35-57	–
9				34-56	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	35-57	–
Forb					
10				34-56	
	prairie clover	DALEA	<i>Dalea</i>	35-57	–
11				34-56	
	globemallow	SPHAE	<i>Sphaeralcea</i>	35-57	–
12				34-56	
	buckwheat	ERIOG	<i>Eriogonum</i>	35-57	–

	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	35-57	–
13				34-56	
	Forb, annual	2FA	<i>Forb, annual</i>	35-57	–
14				34-56	
	Forb, perennial	2FP	<i>Forb, perennial</i>	35-57	–
Shrub/Vine					
15				112-168	
	oak	QUERC	<i>Quercus</i>	115-173	–
16				90-112	
	hairy mountain mahogany	CEMOP	<i>Cercocarpus montanus var. paucidentatus</i>	92-115	–
17				34-56	
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	35-57	–
18				34-56	
19				34-56	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	35-57	–
Tree					
18				34-56	
	juniper	JUNIP	<i>Juniperus</i>	35-57	–

Animal community

Habitat for Wildlife: This site provides habitats which support a resident animal community that is characterized by mule deer, bobcat, desert cottontail, brush mouse, rock mouse, rock squirrel, great horned owl, sparrow hawk, scrub jay, rufous-sided towhee, garter snake, and fence lizard. There is seasonal use by the blue grouse, turkey, and mountain lion. The Lewis woodpecker breeds in these habitats. Band-tailed pigeons will flock to these habitats during years of heavy mast production.

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 Ayon----- B

Recreational uses

Due to the break in the physiographic features, this site has good aesthetic appeal and natural beauty. It is fair for screening, fair to good for hiking and picnicking and fair to poor for camping. Hunting is fair to good for deer and rabbits. This is excellent winter range for deer.

Wood products

This site produces no significant wood except for fuel for campfires.

Other products

Grazing: This site is best suited for grazing during spring, summer and fall. Distribution of livestock is a problem on this site due to the slope. All ages and classes of livestock tend to graze the flatter slopes leaving the steeper slopes ungrazed. It is better suited to grazing by a younger age of livestock due to the slopes and rocks on the surface. Approximately 80 percent of the total annual yield are from species that furnish forage for grazing animals. These species are a large variety of grasses, forbs, and shrubs that provide good nutrition for grazing animals. Continuous grazing during the growing season will cause the more desirable forage plants such as little bluestem, big bluestem, sideoats grama, western wheatgrass, and mountain mahogany to decrease. Species most likely to increase are blue grama, threeawn, oneseed juniper, broom snakeweed, oak brush, and cholla cactus. A system of deferred grazing, which varies the season of grazing and rest in a pasture during successive years, is needed to maintain or improve the plant community. Rest during different seasons of the year will benefit different species. Deferment during the late winter and early spring reduces competition between cattle and deer for the palatable shrubs and early forbs. Rest during April, May and June benefits needle and thread, New Mexico feathergrass, and Indian ricegrass. Rest during late spring and early summer is beneficial to species such as big bluestem and switchgrass.

Other information

Type locality

Location 1: Colfax County, NM
Location 2: Mora County, NM
Location 3: Union County, NM

Contributors

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Approval

Kendra Moseley, 9/12/2023

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	09/18/2026
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:
