

# Ecological site R070AY007NM Malpais Upland

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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.

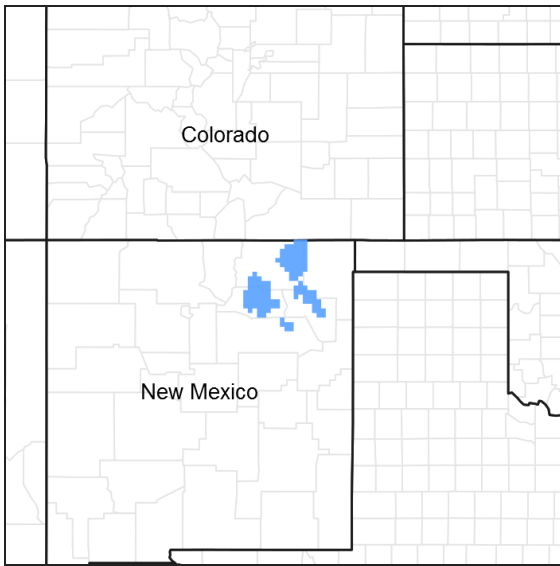


Figure 1. Mapped extent

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.

## Ecological site concept

This site occurs on nearly level to strongly sloping basalt flows, mesas, ridgetops, plains, and adjacent fans. The landscape is characteristically a complex of cobbly or stony soil and basalt rock outcrop. Slopes range from 0 to 9 percent with inclusions of short slopes of as much as 15 percent.

Soils are shallow to deep. Surface texture range from cobbly loam, cobbly silt loam, cobbly clay loam, stony fine sandy loam, stony loam, stony silt loam, stony sandy clay loam and stony clay loam. Basalt fragments make up 5 to 35 percent of the soil and occupy 5 to 35 percent of the surface.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Schizachyrium scoparium</i> (2) <i>Bouteloua gracilis</i>

## Physiographic features

This site occurs on nearly level to strongly sloping basalt flows, mesas, ridgetops, plains, and adjacent fans. The landscape is characteristically a complex of cobbly or stony soil and basalt rock outcrop. Slopes range from 0 to 9

percent with inclusions of short slopes of as much as 15 percent. The included slopes are not a barrier to the movement of livestock. Precipitation ranges from 14 to 16 inches and small areas that receive up to 18 inches. Elevation ranges from 5,500 to 7,500 feet above sea level.

**Table 2. Representative physiographic features**

Landforms	(1) Lava flow (2) Lava plain (3) Lava plateau
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,500 ft
Slope	0–15%
Water table depth	72 in
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)	149 days
Freeze-free period (average)	171 days
Precipitation total (average)	16 in

### **Influencing water features**

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

## Soil features

Soils are shallow to deep. Surface texture range from cobbly loam, cobbly silt loam, cobbly clay loam, stony fine sandy loam, stony loam, stony silt loam, stony sandy clay loam and stony clay loam. Subsurface and subsoil textures range from stony loam, cobbly loam, cobbly clay loam, cobbly silty clay loam, or clay. Permeability is moderate to slow. Available water-holding capacity is low to high. Effective rooting depth is 8 to 60 inches. Air-water relation is favorable for plant growth. Basalt fragments make up 5 to 35 percent of the soil and occupy 5 to 35 percent of the surface.

**Table 4. Representative soil features**

Surface texture	(1) Cobbly loam (2) Cobbly silt loam (3) Stony clay loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to moderate
Soil depth	4–72 in
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	3–8 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	6.6–8.2
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	0–5%

## Ecological dynamics

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

Approximately 90 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, western wheatgrass, big bluestem, sideoats grama, Indiangrass, switchgrass, needle and thread, New Mexico feathergrass and hairy mountain mahogany to decrease. Species most likely to invade are sleepygrass, buffalograss, broom snakeweed, plains pricklypear cactus, and senecio. Species most likely to increase are blue grama, threeawn, galleta, and sagebrush. As the ecological condition deteriorates, it is accompanied by a sharp increase in blue grama. Continuous heavy grazing causes blue grama to form a low, dense turf which is low in productivity. Late spring and early summer rest is especially beneficial to big bluestem, Indiangrass, and switchgrass. Rest from April, May and June allows western wheatgrass, New Mexico feathergrass, and needle and thread to grow and reproduce.

## State and transition model

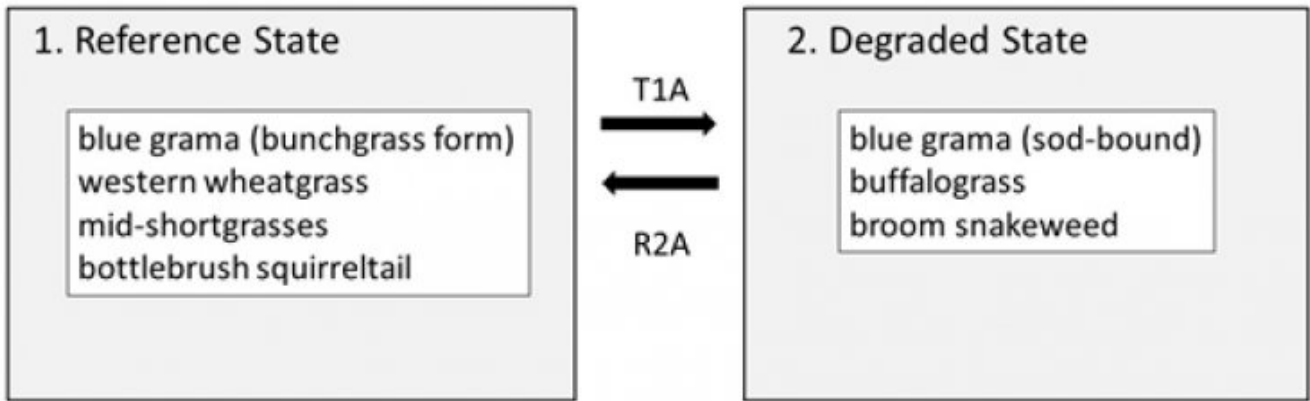


Figure 4. Generalized STM for upland sites in 70A. Note that

**State 1  
Reference State**

Palatable plants are well-represented in this state, and may include little bluestem, yellow Indiangrass, western wheatgrass, and New Mexico feathergrass. Blue grama is present, but is neither dominant nor sod-bound.

**Community 1.1  
Reference Plant Community**

This site is a grass dominated plant community with shrubs and forbs evenly distributed. Mid-grasses dominate with a variety of tall and short-grasses.

**Forest understory.** Other grasses that could appear include: switchgrass, galleta, silver bluestem, spike muhly, ring muhly, wolftail, bottlebrush squirreltail, and plains bristleglass.

Other shrubs that could appear include: currant, juniper, winterfat, oak, and Apache plume.

Other forbs that could appear include: wild buckwheat, Wright buckwheat, wild onion, sunflower, and pepperweed.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	520	860	1200
Forb	60	110	150
Shrub/Vine	60	110	150
<b>Total</b>	<b>640</b>	<b>1080</b>	<b>1500</b>

Table 6. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	5-8%

Grass/grasslike foliar cover	25-35%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	5-15%
Surface fragments >3"	25-40%
Bedrock	0%
Water	0%
Bare ground	20-25%

Figure 6. Plant community growth curve (percent production by month). NM3707, R070AY007NM Malpais Upland HCPC. R070AY007NM Malpais Upland HCPC Grassland with evenly distributed forbs and shrubs..

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

## State 2 Degraded

This state exhibits the effects of prolonged, continuous grazing. Palatable plants listed for State 1 are either absent or poorly-represented. Sod-bound blue grama is often dominant. Other abundant grasses include threeawn and galleta.

## Transition T1A State 1 to 2

Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization. Continuous grazing during the growing season will cause the more desirable forage plants such as little bluestem, western wheatgrass, big bluestem, sideoats grama, Indiangrass, switchgrass, needleandthread, New Mexico feathergrass and hairy mountainmahogany to decrease. Species most likely to invade are sleepygrass, buffalograss, broom snakeweed, plains pricklypear cactus and senecio. Species most likely to increase are blue grama, threeawn, galleta and sagebrush. As the ecological condition deteriorates, it is accompanied by a sharp increase in blue grama. Continuous heavy grazing causes blue grama to form a low, dense turf which is low in productivity.

## Restoration pathway R2A State 2 to 1

Restoration pathway resulting from the implementation of prescribed grazing.

### Conservation practices

Grazing Management Plan - Applied
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## Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				210–270	

	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	215–269	–
2				210–270	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	215–269	–
3				110–160	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	108–161	–
4				110–160	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	108–161	–
5				110–160	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	108–161	–
6				30–50	
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	32–54	–
7				30–50	
	threeawn	ARIST	<i>Aristida</i>	32–54	–
8				30–50	
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	32–54	–
9				30–50	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	32–54	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	32–54	–
10				30–50	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	32–54	–
<b>Forb</b>					
11				20–50	
	prairie clover	DALEA	<i>Dalea</i>	22–54	–
12				20–50	
	globemallow	SPHAE	<i>Sphaeralcea</i>	22–54	–
13				20–50	
	Forb, annual	2FA	<i>Forb, annual</i>	22–54	–
14				20–50	
	Forb, perennial	2FP	<i>Forb, perennial</i>	22–54	–
<b>Shrub/Vine</b>					
15				30–50	
	hairy mountain mahogany	CEMOP	<i>Cercocarpus montanus var. paucidentatus</i>	32–54	–
16				30–50	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	32–54	–
17				30–50	
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	32–54	–
	yucca	YUCCA	<i>Yucca</i>	32–54	–
18				30–50	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	32–54	–

## Animal community

Habitat for Wildlife:

This site provides habitats which support a resident animal community that is characterized by mule deer, coyote, bobcat, bridled weasel, eastern cottontail, rock mouse, southern plains woodrat, marsh hawk, great horned owl, scaled quail, horned lark, roadrunner, six-lined racerunner, and prairie rattlesnake.

## 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

Apache----- D

Ayon----- B

Fallsam----- D

Pidineen----- D

Thunderbird--- D

## Recreational uses

This site has good aesthetic appeal and natural beauty. It has a large variety of plants, many of which bloom from early spring to late fall. Camping, hiking and picnicking is fair. Hunting for deer and rabbits is poor to fair.

## Wood products

This site produces no significant wood products except limited firewood for campfires.

## Other products

Grazing:

This site can be grazed any season of the year by all classes of livestock but may be best suited for spring, summer and fall use due to the occasional winter storms. It is best suited for a younger age of livestock due to the rocky surface. The large variety of grasses, forbs and shrubs provide a well-balanced feed and excellent nutrition for all grazing animals. During normal or above normal years, this site greens up earlier than the other upland sites. Approximately 90 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, western wheatgrass, big bluestem, sideoats grama, Indiangrass, switchgrass, needle and thread, New Mexico feathergrass, and hairy mountain mahogany to decrease. Species most likely to invade are sleepygrass, buffalograss, broom snakeweed, plains pricklypear cactus, and senecio. Species most likely to increase are blue grama, threeawn, galleta, and sagebrush. As the ecological condition deteriorates, it is accompanied by a sharp increase in blue grama. Continuous heavy grazing causes blue grama to form a low, dense turf which is low in productivity. A system of deferred grazing, which varies the time of grazing and rest in a pasture during consecutive years, is needed to maintain the plant community. Late spring and early summer rest is especially beneficial to big bluestem, Indiangrass switchgrass. Rest in April, May, and June allows western wheatgrass, New Mexico feathergrass, and needle and thread to grow and reproduce.

## Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index--- Ac/AUM

100 - 76----- 2.8 – 3.5

75 – 51----- 3.4 – 5.4

50 – 26----- 5.3 – 10.1

25 – 0----- 10.1+

## 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.

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Date	05/05/2005
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Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

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

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2. **Presence of water flow patterns:** Typically none. However with slopes over 15 percent, some minor evidence of water flow patterns less than 1 foot in length.

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3. **Number and height of erosional pedestals or terracettes:** None

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground 20-25 percent.

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Typically none. However with slopes



over 15 percent, some minor (small fine) litter movement can occur within water flow patterns.

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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):** Stability class rating 4-5 is anticipated on soil within interspaces. These values will need to be verified at the reference site.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** SOM 1-3 percent (Apache) A1-0 to 3 inches; dark grayish brown (10YR 4/2) very stony loam, very dark grayish brown (10YR 3/2) moist, moderate, fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 20 percent stones, 20 percent cobble, and 10 percent pebbles.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, forb, shrub functional/structural groups and diverse root structure/patterns reduce raindrop impact and slow overland flow, providing increased time for infiltration to occur. Extended drought reduces short and mid bunchgrasses causing decreased infiltration and increased runoff following intense storm events especially in bare patch areas if present.

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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):** None

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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: Warm-Season Mid Bunchgrass=Warm-Season Short Bunchgrass>

Sub-dominant: Warm-Season Tall Bunchgrass=Cool-Season Rhizomatous>Warm-Season Short Bunchgrass and Mid Bunchgrass

Other: Cool-Season Grasses=Forbs=Shrubs

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Typically minimal. Expect short/mid bunchgrasses mortality/decadence during or following drought.

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14. **Average percent litter cover (%) and depth ( in):** Litter amounts can be reduced during or following extended drought, wildfire can also lead to decreased litter amounts.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** (Low Production 650 pounds per acre) (Average RV Production 1,075 pounds per acre) (High Production 1,500 pounds per acre) Production can be reduced following extended drought or the first growing season following wildfire.

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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: Invasive plants should not occur in reference plant community. However, cheatgrass, Russian thistle, kochia, and other non-native annuals may invade following extended drought if a seed source is available. Blue grama and sage species are major native (non-invasive) increasers on this site.

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17. **Perennial plant reproductive capability:** All plants should be vigorous, healthy and reproductive depending on disturbances i.e. drought. Plants should have numerous seedheads, vegetative tillers, etc. The only limitations are weather, wildfire, and natural disease that may temporarily reduce reproductive capability.

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