

Ecological site R070AY003NM

Shallow Upland

Last updated: 9/12/2023

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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.

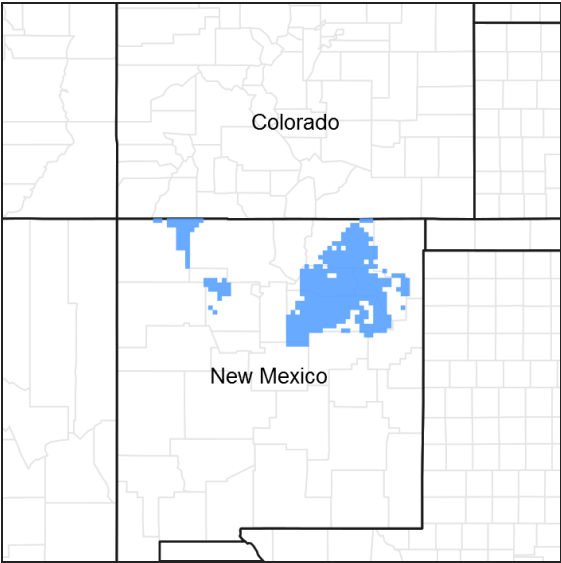


Figure 1. Mapped extent

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 upland landforms where soils are shallow to root-restrictive limestone or petrocalcic materials.

Description from an old MLRA 70A key:  
Slopes are usually 2 to 8 percent, but may range from 0 to 15 percent. The soils are shallow with surface textures of fine sandy loam, loam, silt loam, or clay loam with texture modifiers of stony or gravelly. Vegetation includes sideoats grama, blue grama, hairy grama, little bluestem, needle and thread, New Mexico feathergrass, threeawn, common wolftail, western wheatgrass, bottlebrush squirreltail, wild buckwheat, globemallow, fringed sagewort, Bigelow sagebrush, winterfat, and skunkbush sumac.

This site correlates to the Shallow Ecological Site Group (GX070A01XESG02).

Similar sites

GX070A01X014	<b>Lithic Limestone</b> The Lithic Limestone site is specific to LRU 70A.1.
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Table 1. Dominant plant species

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

## Physiographic features

This occurs on nearly level to rolling upland sites as low rounded ridges, hill slopes, mesas or as low hills (on the convex position of the landscape). Steep-sided canyons frequently dissect the landscape. Slopes are generally 2 to 8 percent but may range from 0 to 15 percent. Precipitation ranges from 14-16 inches. Elevation ranges from approximately 5,000 to 7,500 feet above sea level.

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

Characteristic soils:

Bernal

Crews

Penrose

Plack

**Table 2. Representative physiographic features**

Landforms	(1) Ridge (2) Hill (3) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	5,000–7,500 ft
Slope	0–15%
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

These are well-drained shallow soils. Surface texture is fine sandy loam, loam, gravelly loam, channery loam, silt loam, or clay loam. The subsoil or subsurface texture is loam, clay loam, sandy clay loam, or clay. The parent material or root restriction layer is at depths of 20 inches or less and is limestone or indurated caliche. Permeability is moderate to slow. Available water-holding capacity is low. Air-water relation is favorable for plant growth. Rock fragments make up from 0 to 15 percent of the soil.

**Table 4. Representative soil features**

Surface texture	(1) Very gravelly loam (2) Stony loam (3) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	7–20 in
Surface fragment cover ≤3"	5–25%
Surface fragment cover >3"	0–20%
Available water capacity (0–40in)	1–4 in
Calcium carbonate equivalent (0–40in)	15–40%
Electrical conductivity (0–40in)	0–2 mmhos/cm
Sodium adsorption ratio (0–40in)	0–2
Soil reaction (1:1 water) (0–40in)	7.2–8.4
Subsurface fragment volume ≤3" (Depth not specified)	5–25%
Subsurface fragment volume >3" (Depth not specified)	0–20%

## Ecological dynamics

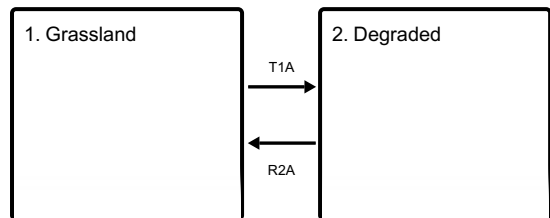
Text from the Grazing Section that is relevant to plant ecology:

Approximately 90 percent of the 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 sideoats grama, little

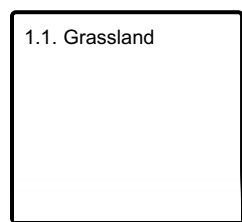
bluestem, needle and thread, New Mexico feathergrass, and western wheatgrass to decrease. The species most likely to invade this site is oneseed juniper where there is an available seed source. Species most likely to increase are blue grama, threeawn spp., ring muhly, and broom snakeweed. As the ecological condition deteriorates, it is accompanied by a sharp decrease in plant cover. This allows greater runoff and the production is greatly reduced. Rest during April, May and June is needed to allow New Mexico feathergrass, needle and thread, and western wheatgrass to grow and reproduce.

## State and transition model

### Ecosystem states



### State 1 submodel, plant communities



## State 1 Grassland

### Community 1.1 Grassland

Reference Plant Community Grassland: In the reference plant community black grama is the dominant grass with blue/hairy grama and New Mexico feathergrass occurring as sub-dominants. Other grasses that occur in significant amounts include sand dropseed, sideoats grama, and wolftail. Shrubs including catclaw acacia, ephedra, yucca, and broom snakeweed are usually sparsely scattered across the site. Continuous grazing pressure can cause a decrease in black grama, New Mexico feathergrass, sideoats grama and little bluestem. This can result in a communities dominated by blue and/or hairy grama, with increases in yucca and broom snakeweed. Other species that characteristically increase include ring muhly, wolftail, sand dropseed, and threeawns. Diagnosis: Grass and litter cover is fairly uniform with few large (greater than 1 meter) bare areas present. Shrubs constitute a minor portion of the plant community with combined canopy averaging five percent or less. Evidence of erosion is minimal.

**Forest understory.** Other grasses that could appear includwe: ring muhly, big bluestem, Indian ricegrass, and galleta.

Other shrubs that could appear include: broom snakeweed, yucca spp., cudweed sagewort, and juniper.

Other forbs that could appear include: hairy goldenaster, nailwort, locoweed spp., dalea, and silverleaf nightshade.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	310	700	860
Forb	30	70	90
Shrub/Vine	30	70	90
<b>Total</b>	<b>370</b>	<b>840</b>	<b>1040</b>

**Table 6. Ground cover**

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	20-25%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-8%
Surface fragments >0.25" and <=3"	5-25%
Surface fragments >3"	0-20%
Bedrock	0%
Water	0%
Bare ground	40-45%

**Figure 5. Plant community growth curve (percent production by month).**  
**NM3703, R070AY003NM Shallow Upland HCPC. R070AY003NM Shallow Upland HCPC Mid-grassland with minor components of 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

## State 2

### Degraded

This state is typically dominated by blue grama, threeawn spp., ring muhly, and broom snakeweed. Oneseed juniper is also common where there is an available seed source.

## 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.

## 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				60–150	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	63–150	–
2				60–150	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	63–150	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	63–150	–
3				60–150	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	63–150	–
4				70–110	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	75–113	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	75–113	–
5				10–40	
	threeawn	ARIST	<i>Aristida</i>	8–38	–
6				10–40	
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	8–38	–
7				10–40	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	8–38	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	8–38	–
8				10–40	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	8–38	–
<b>Forb</b>					
9				10–40	
	buckwheat	ERIOG	<i>Eriogonum</i>	8–38	–
10				10–40	
	globemallow	SPHAE	<i>Sphaeralcea</i>	8–38	–
11				10–40	
	Forb, annual	2FA	<i>Forb, annual</i>	15–38	–
12				10–40	
	Forb, perennial	2FP	<i>Forb, perennial</i>	15–38	–
<b>Shrub/Vine</b>					
13				10–40	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	8–38	–
14				10–20	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	15–23	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	15–23	–
15				10–40	
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	15–38	–
16				10–40	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	8–38	–

## Animal community

Habitat for Wildlife: This site provides habitats which support a resident animal community that is characterized by pronghorn antelope, coyote, gray fox, black-tailed jackrabbit, northern grasshopper mouse, hispid pocket mouse, marsh hawk, horned lark, meadowlark, prairie rattlesnake, six-lined racerunner, and the Great Plains toad.

## 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

Crews----- D

Bernal-----D

Penrose----- D

Plack----- D

Pidineen----- D

## Recreational uses

This site has fair aesthetic appeal because of the open space. It provides poor camping, hiking, and picnicking. Hunting is fair for rabbits and upland game birds. The site may provide limited winter use by big game (deer) when sites are closely associated with breaks in physiographic features of the landscape. Hunting antelope on this site is good.

## Wood products

This site has no significant value for wood products.

## Other products

Grazing:

This site can be grazed any season of the year by all classes and kinds of livestock. Because of the potential for forb production, this site may favor sheep or antelope grazing. Approximately 90 percent of the 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 sideoats grama, little bluestem, needle and thread, New Mexico feathergrass, and western wheatgrass to decrease. The species most likely to invade this site is oneseed juniper where there is an available seed source. Species most likely to increase are blue grama, threeawn spp., ring muhly, and broom snakeweed. As the ecological condition deteriorates, it is accompanied by a sharp decrease in plant cover. This allows greater runoff and the production is greatly reduced. A system of deferred grazing, which varies the time of grazing and rest in a pasture during successive years is needed to maintain or improve the plant community. Rest during April, May, and June is needed to allow New Mexico feathergrass, needle and thread, and western wheatgrass to grow and reproduce.

## Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index----- Ac/AUM

100 - 76----- 3.0 – 3.5

75 – 51----- 3.4 – 4.5

50 – 26----- 4.4 – 12.0

25 – 0----- 12.0+

## 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	04/26/2005
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- 1. Number and extent of rills:** None on gentle slopes less than 10 percent, slight on steeper slopes over 10 percent.

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- 2. Presence of water flow patterns:** None to minimal on gentle slopes less than 10 percent. On steeper slopes over 10 percent, flow paths should be broken and irregular in appearance. As slope increases, flow paths become more apparent and may be connected.

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- 3. Number and height of erosional pedestals or terracettes:** None to slight on gentle slopes less than 10 percent. Expect some evidence of pedestalled plants when slope increase over 10 percent.

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- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 25-35 percent or less bare ground, with bare patches generally less than 12 inches. Extended drought may increase bare ground by 5-10 percent.

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- 5. Number of gullies and erosion associated with gullies:** Generally none. If present, usually on steeper slopes.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None to slight. Minor wind erosion can occur with disturbances such as wildfire or extended drought.
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7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is associated with water flow patterns and may move as much as 1-3 feet or more down slope during extreme storm events, especially on steeper slopes.
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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 anticipated to be 3-4 inch interspaces at soil surface. These values need verification.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Average SOM ranges from 1-5 percent. (Bernal) A1-0 to 4 inches; brown 7.5YR 5/2) loam, dark brown (7.5YR 3/2) moist; weak very fine granular structure; loose, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores.
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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 reduces raindrop impact and slows overland flow, providing increased time for infiltration to occur. However, the composition of the plant community has less effect on infiltration and runoff than does slope or amount of bare ground.
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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: Cool-Season Mid Bunchgrass
- Other: Cool-Season Grasses=Shrubs=Forbs
- Additional:
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** None to slight. Decadence may exist on areas inaccessible to grazing animals, usually when slope increases.
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14. **Average percent litter cover (%) and depth ( in):** Litter cover during and following extended drought can drop to less than 5 percent.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** (Low Production 400 pounds per acre) (Average RV Production 750 pounds per acre) (High Production 1,100 pounds per acre) Production can be reduced following extended drought or in 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. Oneseed juniper may encroach from adjacent sites with lack of fire.
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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, vegetation, tillers etc. The only limitations are weather, wildfire, and natural disease that may temporarily reduce reproductive capability.
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