USDA Natural Resources
Conservation Service

Ecological site R070AY019NM
Shallow Savanna

Last updated: 9/12/2023
Accessed: 05/14/2025

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.

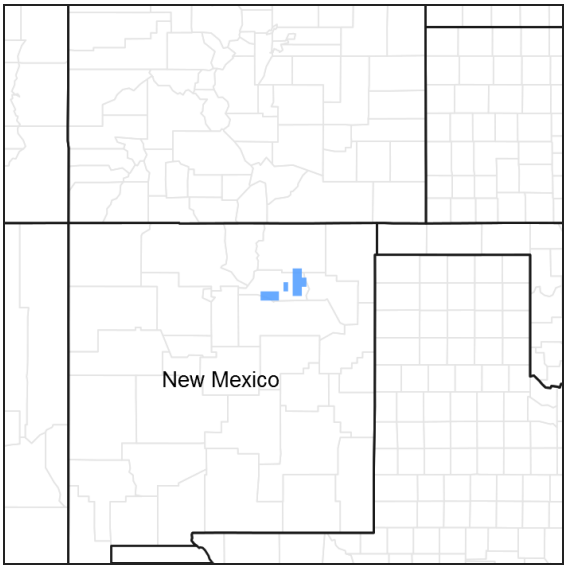

Figure 1. Mapped extent

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.

Ecological site concept

This site applies to areas where soils are shallow to a root-restrictive layer, and slopes are between 1 and 35 percent. Given this broad range of abiotic characteristics, it appears that this site overlaps with a number of others in MLRA 70A. See Similar Sites below.

Associated sites

GX070A01X004	**Shallow Loamy** Delete row once EDIT is fully functional.
GX070A01X013	**Lithic Sandstone** Delete row once EDIT is fully functional.
GX070A01X014	**Lithic Limestone** Delete row once EDIT is fully functional.
GX070A01X006	**Slopes** Delete row once EDIT is fully functional.
GX070A01X007	**Limy Escarpments** Delete row once EDIT is fully functional.

Similar sites

GX070A01X004	**Shallow Loamy** The Shallow Loamy site applies to areas where slopes are 10% or less, and soils are shallow to paralithic contact with shale or calcareous sandstone.
GX070A01X013	**Lithic Sandstone** The Lithic Sandstone site applies to areas where slopes are 10% or less, and soils are shallow to lithic sandstone.
GX070A01X014	**Lithic Limestone** The Lithic Limestone site applies to areas where slopes are 10% or less, and soils are shallow to lithic limestone.
GX070A01X006	**Slopes** The Slopes site applies to escarpments that lack rock outcrop. Soils on many of the upper escarpment positions are shallow to paralithic materials.
GX070A01X007	**Limy Escarpments** The Limy Escarpments site applies to escarpments that exhibit rock outcrop. Soils on many of the upper escarpment positions are shallow to lithic or paralithic materials.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site is on hills, ridges, and plains at elevations of 5,500 to 7,800 feet. Slopes are 1 to 35 percent. The soils formed in fine textured material weathered from shale, claystone, or sandstone. The climate is semiarid continental with mean annual air temperature of 47 to 56 degrees F, and a mean summer temperature of 65 to 70 degrees F. Annual precipitation is 10 to 18 inches with about 70 percent falling during the frost-free season, which lasts 115 to 160 days.

North and east facing slopes usually produce more vegetation than south and west facing slopes.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Escarpment (3) Hill
Flooding frequency	None
Elevation	1,768–2,195 m
Slope	10–35%
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)	162 days
Freeze-free period (average)	140 days
Precipitation total (average)	381 mm

Influencing water features

Site may lie along riverine or wash channels where they wander toward a mesa.

Soil features

Soils are well drained, very shallow and shallow over shale or limestone. Surface texture is very flaggy clay loam, silt loam, silty clay loam, gravelly sandy loam, or gravelly clay loam. Subsurface textures are silty clay, clay loam, or clay; with 35 to 60 percent clay. Permeability is moderate to slow. Available water holding capacity is very low to low. Effective rooting depth is 7 to 20 inches.

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

Characteristic soils:
Mion
Penrose
Litle

Table 4. Representative soil features

Surface texture	(1) Flaggy clay loam (2) Silt loam (3) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderate to slow
Soil depth	20–51 cm
Surface fragment cover <=3"	30–35%
Surface fragment cover >3"	0–5%

Available water capacity (0-101.6cm)	5.08–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	30–35%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

The structure of the potential natural plant community is predominantly grasses with scattered overstory of oneseed juniper. Grass species are dominated by warm-season mid-grasses. Woody species make up 30 percent of the vegetation. Juniper, mountain mahogany, and oak are the major woody species. Forbs make up 10 percent of the vegetation.

Continuous grazing in the growing season will cause the more desirable forage plants such as sideoats grama, little bluestem, western wheatgrass, mountain mahogany, New Mexico feathergrass, and winterfat to decrease.

Species most likely to increase are blue grama, galleta, threeawn, oneseed juniper, sleepygrass, and oakbrush.

As the condition further deteriorates it is accompanied by a sharp increase in oneseed juniper and oak brush. Ground cover is greatly reduced, causing excessive erosion which exposes the weathered shale.

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 allows western wheatgrass to grow and reproduce. Rest during the late winter and early spring is beneficial to shrubs such as mountain mahogany.

State and transition model

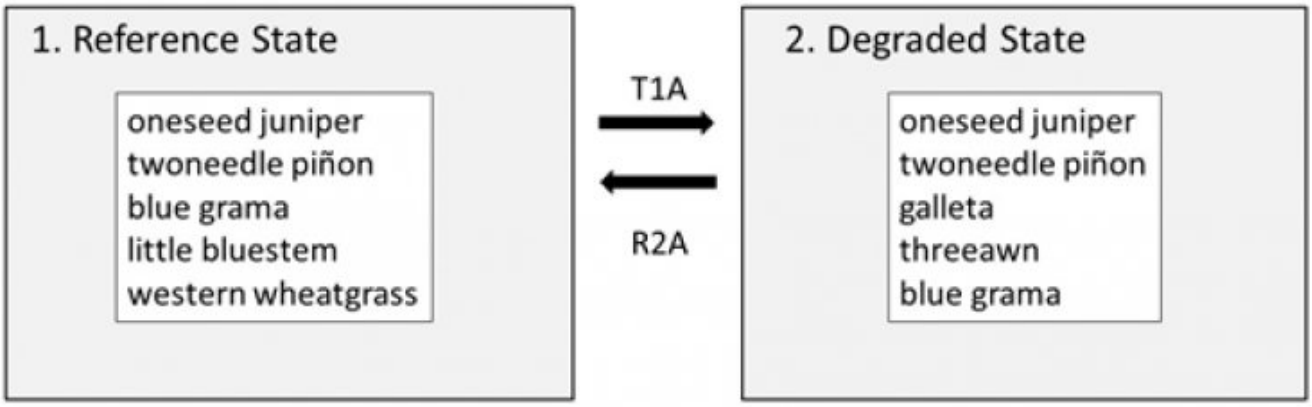

Figure 6. Generalized STM for shallow sites in 70A

State 1
Reference State

Community 1.1
Reference Plant Community

The structure of the potential natural plant community is predominantly grasses with scattered overstory of oneseed juniper. The grass community is dominated by warm-season mid-grasses. Woody species make up 30 percent of the vegetation. Juniper, mountain mahogany, and oak are the major woody species. Forbs make up 10 percent of the vegetation. Other grasses may occur in trace amounts include vine mesquite, prairie junegrass, and big bluestem. Other woody plants may occur in trace amounts include; winterfat, skunkbush, and Bigelow sagebrush. Forbs that may occur in trace amounts include; asters and Indian paintbrush.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	359	448	729
Tree	168	224	336
Forb	56	78	112
Total	**583**	**750**	**1177**

Table 6. Ground cover

Tree foliar cover	5-10%
Shrub/vine/liana foliar cover	10-15%
Grass/grasslike foliar cover	20-25%
Forb foliar cover	2-10%
Non-vascular plants	0%
Biological crusts	0%

Litter	10-15%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	30-35%
Bedrock	5-10%
Water	0%
Bare ground	10-15%

Figure 8. Plant community growth curve (percent production by month). NM3719, R070AY019NM Shallow Savanna HCPC. R070AY019NM Shallow Savanna HCPC.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	20	25	13	5	0	0

State 2
Degraded

This state is generally dominated by such plants as blue grama, galleta, threeawn, oneseed juniper, sleepygrass, and oakbrush.

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

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**blue grama**			56–168	
	blue grama	BOGR2	*Bouteloua gracilis*	56–168	–
2	**sideoats grama**			84–224	
	sideoats grama	BOCU	*Bouteloua curtipendula*	84–224	–
3	**little bluestem**			56–168	
	little bluestem	SCSCS	*Schizachyrium scoparium var. scoparium*	56–168	–
4	**wolftail**			11–56	
	wolfstail	LYCUR	*Lycurus*	17–56	–
5	**western wheatgrass**			34–112	
	western wheatgrass	PASM	*Pascopyrum smithii*	28–112	–
7	**threeawn**			11–56	
	slimspike threeawn	ARLO16	*Aristida longespica*	17–56	–
8	**needle and thread**			34–112	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	28–112	–
11	**New mexico feathergrass**			34–112	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	28–112	–
Tree					
9	**oneseed juniper**			34–112	
	oneseed juniper	JUMO	*Juniperus monosperma*	28–112	–
10	**pinion pine**			11–56	
	twoneedle pinyon	PIED	*Pinus edulis*	17–56	–
Shrub/Vine					
12	**mountain mahogany**			11–56	
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	17–56	–
13	**fringe sage**			11–56	
	field sagewort	ARCA12	*Artemisia campestris*	17–56	–
14	**apache plume**			11–56	
	Apache plume	FAPA	*Fallugia paradoxa*	17–56	–
15	**fourwing saltbush**			11–56	
	fourwing saltbush	ATCAC	*Atriplex canescens var. canescens*	17–56	–
16	**oak brush**			11–56	
	Gambel oak	QUGA	*Quercus gambelii*	17–56	–
Forb					
17	**Buckwheat**			11–56	
	buckwheat	ERIOG	*Eriogonum*	17–56	–

Animal community

This site provides habitats which support a resident animal community that is characterized by mule deer, coyote, bobcat, eastern cottontail, rock squirrel, southern plains woodrat, piñon mouse, great horned owl, ferruginous hawk, plain titmouse, brown towhee, scrub jay, western diamondback rattlesnake, and red spotted toad.

Hydrological functions

Characteristic
Soil Series Hydrologic Group
Mion D
Penrose D
Litle D

Recreational uses

This site has high aesthetic appeal and natural beauty with a variety of plants and physiographic features breaking the open space of the landscape. Hiking is fair to good. Camping and picnicking are poor to fair. Deer hunting is good. The site is good range for deer. Bird watching is fair.

Wood products

Some piñon and juniper fence posts and firewood.

Other products

Grazing: This site is adapted to spring, summer and fall grazing. Distribution of domestic livestock is a problem on this site. All ages and classes prefer to graze flatter slopes, leaving the steeper slopes ungrazed. It is better suited to younger livestock. Goats will be best suited to use the large amount of woody species on the site. Approximately 70 percent of the total annual yield is by species that produce forage or browse. The large variety of grasses, forbs, and shrubs provide a balanced feed and excellent nutrition for all grazing and browsing animals.

Continuous grazing in the growing season will cause the more desirable forage plants such as sideoats grama, little bluestem, western wheatgrass, mountain mahogany, New Mexico feathergrass, and winterfat to decrease.

Species most likely to increase are blue grama, galleta, threeawn, oneseed juniper, sleepygrass, and oakbrush.

As the condition further deteriorates, it is accompanied by a sharp increase in oneseed juniper and oak brush. Ground cover is greatly reduced, causing excessive erosion which exposes the weathered shale.

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 allows western wheatgrass to grow and reproduce. Rest during the late winter and early spring is beneficial to shrubs such as mountain mahogany.

Other information

Guide to Initial Stocking rate in Acres per Animl Unit Month.
Range Condition----------Acres/AUM
75 plus----------3.4 to 4.6
50 to 75----------4.5 to 6.8
25 to 49----------6.7 to 12.6
25 or less----------12.6 plus.

Contributors

Don Sylvester
John Tunberg

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	05/14/2025
Approved by	Kendra Moseley
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:**
