Ecological site R070AY015NM
Shallow Shale

Last updated: 9/12/2023
Accessed: 05/18/2024

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.

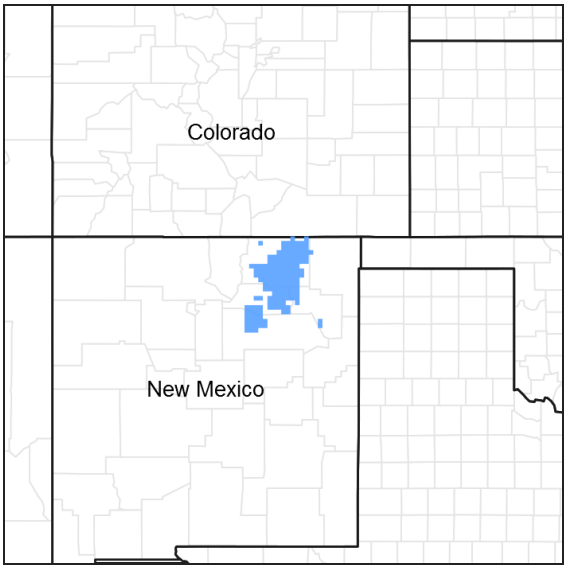

Figure 1. Mapped extent

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

From an old key to ESDs in MLRA 70A:
12B. Shallow over shale. Slopes range from 5 to 15 percent. The soils are very shallow and shallow. The textures are clay loam and silty clay loam with a possible modifier of flaggy. Vegetation includes blue grama, alkali sacaton, western wheatgrass, vine mesquite, galleta, sideoats grama, buffalograss, plains muhly, spike muhly, threeawn, ring muhly, western ragweed, globemallow, fourwing saltbush, winterfat, and oak.

This site occurs on soils derived from shale and limestone, and correlates to the Canadian Plateaus LRU (70A.1) of MLRA 70A. Where soils are shallow to lithic contact with limestone, this site overlaps with the Lithic Limestone site. Where soils are shallow to paralithic contact with shale, this site overlaps with the Limy or Loamy sites, depending of whether or not the surface is highly calcareous .

Similar sites

GX070A01X014	**Lithic Limestone** This site occurs on soils that are shallow to lithic contact with limestone, and have slopes of 10% or less.
GX070A01X004	**Shallow Loamy** This site occurs on soils that are shallow to paralithic contact with shale, and have slopes of 10% or less.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site occurs on hills, plains, ridges, hogbacks, cuestas, and mesa tops. Soils formed in thin, calcareous, loamy materials weathered in place from limestone and interbedded limy materials. Slopes are 2 to 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Hill (3) Ridge
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Rare to occasional
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	1,768–2,195 m
Slope	2–15%
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)	406 mm

Influencing water features

This site is not associated with water features or wetlands.

Soil features

Soils are very shallow to shallow. Surface textures are loam, silt loam, clay loam. Subsurface textures are loam, silt loam, clay loam. permeability is low. Slopes are 1 to 35 percent. Mean annual precipitation is about 13 inches and mean annual temperature is about 51 degrees F. Effective rooting depth is 7 to 20 inches. Because of slow permeability, the air-water relationship is not optimum for plant growth.

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

Characteristic soils:
Litle
Penrose
Mion

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Silty clay loam (3) Loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to slow
Soil depth	18–51 cm
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	2.54–7.62 cm
Calcium carbonate equivalent (0-101.6cm)	2–40%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–35%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This is a plant community that is dominated by mid-grasses, with scattered woody species making up an important part of the plant community. Perennial and annual forbs are evenly distributed and make up a minor part of the community. Blue grama, alkali sacaton and western wheatgrass are the most abundant species.

As the ecological condition deteriorates , it is accompanied by a sharp decrease in plant cover. When adequate plant cover is lacking, this site is subject to severe sheet and gully erosion due to a very slow water intake rate.

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 summer is beneficial to warm season plants such as blue grama, alkali sacaton, vine mesquite, and sideoats grama. Spring rest will also allow alkali sacaton sufficient time to green up before grazing.

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

Approximately 80 percent of the total annual yield is from species that furnash forage for grazing or browsing. A variety of grasses, forbs and shrubs provide good nutrition to grazing and browsing animals. Continuous grazing during the growing season will cause the more desirable forage plants such as western wheatgrass, vine mesquite, sideoats grama, alkali sacaton, fourwing saltbush, and winterfat to decrease. Species most likely to invade include sleepygrass and broom snakeweed. Species most likely to increase are blue grama, galleta grass, buffalograss, mat muhly, cholla cactus, plains pricklypear, and oneseed juniper.

State and transition model

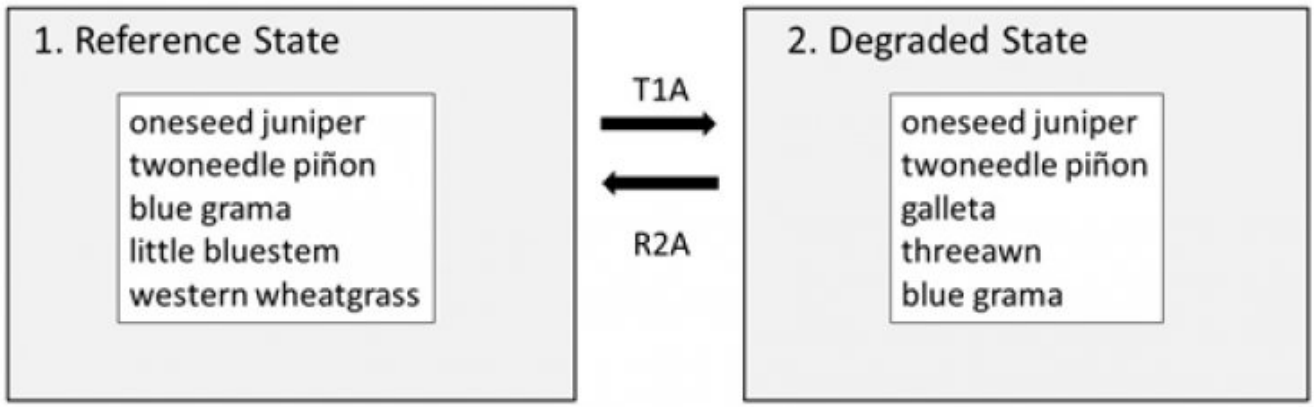

Figure 4. Generalized STM for shallow soils in 70A

State 1
Reference State

This is a plant community that is dominated by mid-grasses, with scattered woody species making up an important part of the plant community. Perennial and annual forbs are evenly distributed and make up a minor part of the community. Blue grama, alkali sacaton, and western wheatgrass are the most abundant species.

Community 1.1

Reference Plant Community

This is a plant community that is dominated by mid-grasses, with scattered woody species making up an important part of the plant community. Perennial and annual forbs are evenly distributed and make up a minor part of the community. Blue grama, alkali sacaton, and western wheatgrass are the most abundant species. Other grasses on the site in trace amounts are mat muhly and bottlebrush squirreltail. Other woody and succulent plants, which occur in trace amounts, include: walkingstick cholla, plains pricklypear, juniper, wolfberry, plains yucca, and sagewort. Other forbs present in trace amounts include: Wright eriogonum, locoweed, and wild buckwheat.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	471	796	1020
Shrub/Vine	101	135	213
Forb	67	90	146
Total	**639**	**1021**	**1379**

Table 6. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	12-15%
Grass/grasslike foliar cover	30-35%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	10-15%
Surface fragments >0.25" and <=3"	0-2%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40-45%

Figure 6. Plant community growth curve (percent production by month). NM3715, R070AY015NM Shallow Shale HCPC. R070AY015NM Shallow Shale 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

Transition T2A
State 1 to 2

Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization.

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	**Short Warm Season**			34–359	
	blue grama	BOGR2	*Bouteloua gracilis*	182–226	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	20–73	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	20–73	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	20–73	–
	buffalograss	BODA2	*Bouteloua dactyloides*	20–73	–
	vine mesquite	PAOB	*Panicum obtusum*	34–56	–
2	**Tall Warm Season**			135–179	
	alkali sacaton	SPAI	*Sporobolus airoides*	137–182	–
3	**Tall Cool Season Stolon**			135–179	
	western wheatgrass	PASM	*Pascopyrum smithii*	137–182	–
4	**Mid warm season stolon**			34–56	
	galleta grass	PLEUR12	*Pleuraphis*	34–56	–
5	**Tall warm season**			34–56	
	sideoats grama	BOCU	*Bouteloua curtipendula*	34–56	–
6	**Short Coarse warm season**			22–34	
	threeawn	ARIST	*Aristida*	20–39	–
Shrub/Vine					
7	**Mid palatable drought tolerant**			34–56	
	fourwing saltbush	ATCA2	*Atriplex canescens*	34–56	–
8	**short high protein**			22–34	
	winterfat	KRLA2	*Krascheninnikovia lanata*	20–39	–
9	**Low durable deciduous**			22–34	
	Gambel oak	QUGA	*Quercus gambelii*	20–39	–
Forb					
10	**perennial forbs**			11–34	
	hairy ragweed	AMCA7	*Ambrosia canescens*	11–34	–
	globemallow	SPHAE	*Sphaeralcea*	11–34	–

Animal community

Wildlife: This site provides habitat for mule deer, coyote, desert cottontail, thirteen-lined ground squirrel, marsh hawk, scaled quail, roadrunner, western racer, and woodhouse toad.

Hydrological functions

Precipitation pattern: peak periods between April and August, dries between November and February. Frost-free period: 125 to 165 days.

Characteristic Soil-----Hydrologic Group
Minion----------C
Penrose ----------D

Recreational uses

This site has attractive aesthetic appeal and natural beauty. It is fair for camping, hiking, and picnicking. Hunting is fair for deer, rabbits, and quail.

Wood products

Limited wood from juniper for firewood unless site is heavily enroached by juniper and piñon trees.

Other products

Guide to initial Stocking rates as Acres per Animal Unit Month.
Range Condition----------AC/AUM
100%----------2.5 to 3
75%----------2.9 to 4.6
50%----------4.5 to 9.0
25%----------9.1 plus

Other information

Grazing: This site can be used any season of the year by all classes of grazing animals. Approximately 80 percent of the total annual yield is from species that furnish forage for grazing or browsing. A variety of grasses, forbs, and shrubs provide good nutrition to grazing and browsing animals. Continuous grazing during the growing season will cause the more desirable forage plants such as western wheatgrass, vine mesquite, sideoats grama, alkali sacaton, fourwing saltbush, and winterfat to decrease. Species most likely to invade include sleepygrass and broom snakeweed. Species most likely to increase are blue grama, galleta, buffalograss, mat muhly, cholla cactus, plains pricklypear, and oneseed Juniper.

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Type locality

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

Contributors

Don Sylvester
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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	05/18/2024
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):

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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:

    Sub-dominant:

    Other:

    Additional:

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
