

Ecological site R070BY069NM Shallow Plains (Cool)

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 soils that are shallow to root-restrictive layers, and have textures of fine sandy loam or coarser. Slopes range from 0 to 5 percent.

This site occurs on the cooler end of the MLRA 70B climatic gradient.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on hillslopes, mesas, and ridges that are structurally controlled by bedrock or petrocalcic layers. Slope ranges from 0 to 5 percent. Aspect varies but is not ecologically significant. Elevations range from 4,300 to 5,400 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mesa (3) Ridge
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	1,311–1,646 m
Slope	1–15%
Ponding depth	0–3 cm
Aspect	Aspect is not a significant factor

Climatic features

The narrative below applies to MLRA 70B in general. However, this site is distinguished as being “cool.” Thus, it can be expected to either occur at the cooler end of this climatic spectrum and, perhaps, extend beyond it.

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

Annual average precipitation ranges from 11 to 16 inches. Roughly 78 percent of the moisture falls during the 6-month period of May through October. Most of this summer precipitation falls in the form of brief and heavy afternoon and evening thunderstorms. Hail may accompany the more severe summer storms. In the winter, there is normally only one day a month when as much as one-tenth inch of moisture falls, usually in the form of snow. Snow seldom lies on the ground for more than a few days.

Temperatures are characterized by a distinct seasonal change and large annual and diurnal temperature ranges. Summers are moderately warm. Maximum temperature average above 90 degrees F from July to August, and an average summer includes about 80 days with high readings exceeding 90 degrees F and 10 days with readings above 100 degrees F. Temperatures usually fall rapidly after sundown and lows average 60 degrees F on most summer nights. Winters are mild, sunny, and dry. Daytime shade temperatures in midwinter usually rise to the 50’s. However, freezing temperatures normally occur at night from mid-November to mid-March.

The freeze-free season ranges from 196 to 218 days. Dates of the last freeze range from April 11th to April 17th and the first freeze ranges from October 20th to October 25th.

Both temperature and rainfall distribution favor warm-season, perennial plant communities in the area. However, sufficient late winter and early spring moisture allows cool-season species to occupy a minor component within the plant community.

Climate data was obtained from <http://www.wrcc.dri.edu/summary/climsmnm.html> web site. Data were interpreted utilizing NM Climate Summarizer spreadsheet.

Table 3. Representative climatic features

Frost-free period (average)	192 days
Freeze-free period (average)	218 days
Precipitation total (average)	406 mm

Influencing water features

This ecological site is not associated with water features or wetlands.

Soil features

Soils are very shallow to shallow. Surface and subsurface textures are fine sand, sandy loam, loamy very fine sand, gravelly very fine sandy loam, gravelly fine sandy loam, and loamy sand.. Root-restrictive layers including caliche, gypsum, sandstone, and limestone, occur at depths of 9 to 20 inches.

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

Table 4. Representative soil features

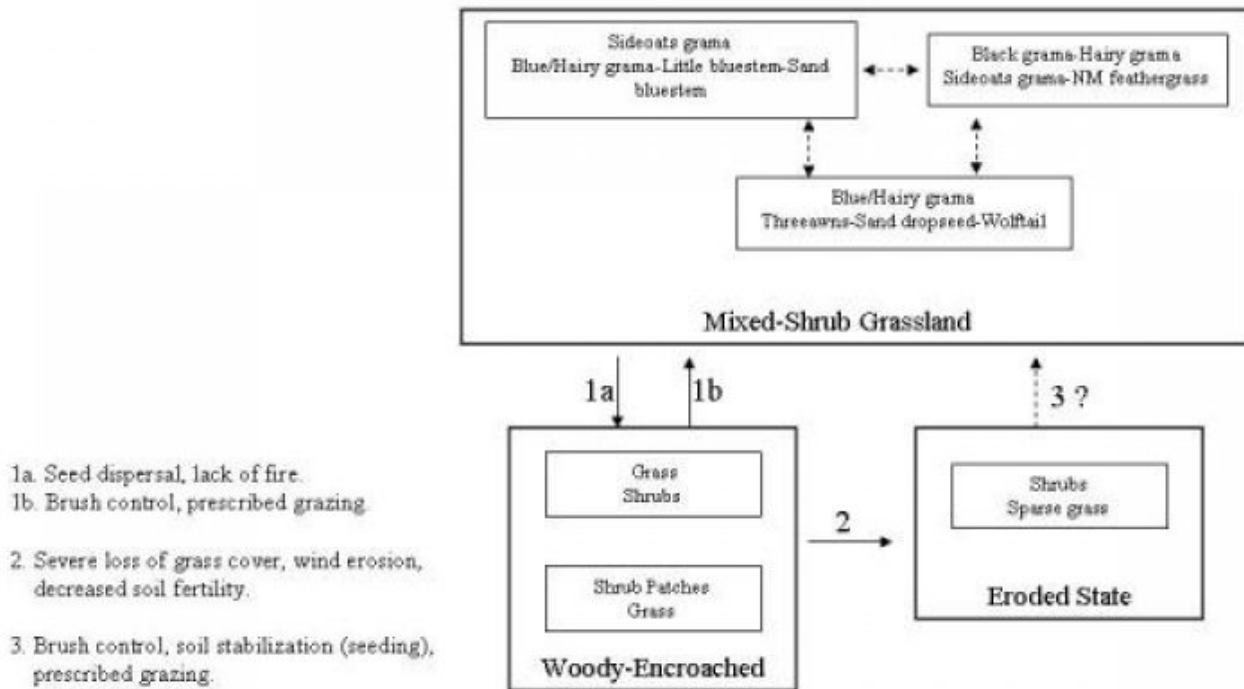
Surface texture	(1) Fine sand (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Excessively drained to well drained
Permeability class	Rapid to very rapid
Soil depth	23–51 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.54–7.62 cm
Calcium carbonate equivalent (0-101.6cm)	10–35%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–25%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The reference plant community is a mixed-shrub grassland, characterized by a mixture of warm-season, short-, tall-, and mid-grasses. Shrubs and the occasional juniper are scattered across the site. Forbs are typically a minor component with their distribution and abundance dependent on precipitation. Continuous grazing during the growing season can cause a decrease in the tall- and mid-grasses and a corresponding increase in the more grazing-resistant or less palatable short-grasses. Seed dispersal by livestock and wildlife can initiate an increase in woody species (Woody-Encroached state). Continued loss of grass cover can result in accelerated erosion and loss of soil productivity (Eroded state).

State and transition model

MLRA 70, CP-2 Shallow Plains



State 1 Mixed-Shrub Grassland

This state contains a mix of grasses and shrubs.

Community 1.1 Mixed-Shrub Grassland

In the reference plant community, sideoats grama is the dominant grass. Blue and/or hairy grama, little bluestem, and sand bluestem are sub-dominants. Other grasses that occur in significant amounts include black grama and New Mexico feathergrass. Shrubs including skunkbush sumac, catclaw mimosa, sacahuista, small soapweed yucca, and juniper are scattered across the site. Continuous grazing during the growing season can rapidly cause a decrease in the tall- and mid-grasses such as sand bluestem, little bluestem, and sideoats grama. If the plant community continues to decline, blue and/or hairy grama may dominate with a corresponding increase in threeawns, sand dropseed and wolfstail. Diagnosis: Grass and litter cover is fairly uniform with few large (greater than 1 meter) bare areas present. Tall- and mid-grasses are present. Shrubs and a few juniper trees are present, with combined canopy averaging 5 to 11 percent. Evidence of erosion is minimal. Other plants that may occur include threeawns, bottlebrush squirreltail, plains muhly, sand muhly, Arizona cottontop, Indian ricegrass, algerita, sand sagebrush, Bigelow sagebrush, Opuntia species, fourwing saltbush, winterfat, verbena, annual mustard, purple nightshade, curly dock, tansymustard, Russian thistle, and Astragalus species.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	717	897	1345
Shrub/Vine	90	101	168
Forb	45	78	168
Tree	45	56	78
Total	897	1132	1759

Table 6. Ground cover

Tree foliar cover	2-5%
Shrub/vine/liana foliar cover	3-6%
Grass/grasslike foliar cover	20-25%
Forb foliar cover	2-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40-50%

**Figure 5. Plant community growth curve (percent production by month).
NM4069, R070BY069NM Shallow Plains Cool Reference State.
R070BY069NM Shallow Plains Cool Reference State.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

State 2 Woody-Encroached

This state contains abundant woody species.

Community 2.1 Woody-Encroached

This phase is characterized by an increase in shrubs and a severe decrease or loss of most tall- and mid-grasses. Shrubs such as skunkbush sumac, catclaw mimosa, mesquite, sacahuista, and juniper occur at increased densities relative to the Mixed-Shrub Grassland state. In some areas, patches of skunkbush sumac, catclaw mimosa, or sacahuista may dominate. Blue and/or hairy grama are the dominant grasses. Other grasses typically include threeawns, sand dropseed, sand muhly, and wolfstail. Diagnosis: Shrubs occur at increased densities (15 to 20 percent canopy cover). Tall- and mid-grasses are sparse or absent. Grass cover is variable, ranging from fairly uniform to patchy. Transition to Woody-Encroached (1a) Transitions to the Woody-Encroached state are believed to occur mainly in response to seed dispersal by livestock and wildlife and decreased fire frequency. Drought may also favor deeper-rooted shrubs over grasses. If fire was historically important in controlling shrub densities on shallow sites, then decreased fire frequency may favor shrub encroachment. Alternatively, fire may initiate increases in some shrub species such as skunkbush sumac by stimulating germination of dormant seeds. Key indicators of approach to transition: Significant decrease in cover of sand bluestem and little bluestem Increase in the number of shrub seedlings Transition back to Mixed-Shrub Grassland (1b) Brush control is necessary to reduce shrub densities. Prescribed grazing will help to ensure adequate rest following brush control and will assist in the

establishment and maintenance of grass cover.

Figure 6. Plant community growth curve (percent production by month).
 NM4069, R070BY069NM Shallow Plains Cool Reference State.
 R070BY069NM Shallow Plains Cool Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

State 3 Eroded

This state shows evidence of significant erosion such as truncated topsoil and/or pedestalling at the surface.

Community 3.1 Eroded

This phase is characterized by a loss of grass cover and accelerated erosion. Remaining grass cover consists of scattered patches of blue grama, hairy grama, and threeawns. Diagnosis: Grass and litter cover are sparse, and patches of bare ground are interconnected. Erosion is evidenced by the common occurrence of pedestalled plants and wind-scoured areas. Transition to Eroded State (2) Continuous heavy grazing pressure, especially in conjunction with drought, can cause the loss of grass cover and subsequent erosion. The redistribution and loss of topsoil, organic matter, and nutrients greatly decreases productivity and limits the ability of the plant community to recover. Key indicators of approach to transition: Increase in the amount bare patches Decrease in grass and litter cover Pedestalling of plants Transition back to Mixed-Shrub Grassland (3) Brush control is necessary to reduce the density of shrubs to levels approximating those of the reference community. Seeding is necessary to reestablish grass cover and stabilize soils against continued erosion. Prescribed grazing will help ensure adequate rest periods following seeding and maintain adequate grass and litter cover. Potential for recovery is restricted by shallow soils, low available water capacity, limited precipitation, and low nutrient availability.

Figure 7. Plant community growth curve (percent production by month).
 NM4069, R070BY069NM Shallow Plains Cool Reference State.
 R070BY069NM Shallow Plains Cool Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

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 hairy grama			90–168	
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	118–177	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	90–168	–
2	little bluestem			112–179	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	118–177	–
3	sideoats grama			179–235	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	177–235	–
4	black grama			56–179	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	59–177	–
5	New Mexico feathergrass			56–112	
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	59–118	–
6	Sand bluestem			112–179	

	sand bluestem	ANHA	<i>Andropogon hallii</i>	118–177	–
7	plains bristlegrass			34–56	
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	36–59	–
8	sand- mesa dropseed			34–56	
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	36–59	–
	mesa dropseed	SPFL2	<i>Sporobolus flexuosus</i>	36–59	–
9	yellow indiagrass			34–56	
	Indiagrass	SONU2	<i>Sorghastrum nutans</i>	36–59	–
15	purple lovegrass			34–67	
	tufted lovegrass	ERPEP2	<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	36–63	–
Forb					
10	perennial forbs			34–56	
	leatherweed	CRPOP	<i>Croton pottsii</i> var. <i>pottsii</i>	36–59	–
	buckwheat	ERIOG	<i>Eriogonum</i>	36–59	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	36–59	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	36–59	–
11	misc forbs annual			34–56	
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	36–59	–
Shrub/Vine					
12	juniper, nolina, skunkbush, mimosa			56–112	
	juniper	JUNIP	<i>Juniperus</i>	59–118	–
	catclaw mimosa	MIACB	<i>Mimosa aculeaticarpa</i> var. <i>biuncifera</i>	59–118	–
	sacahuista	NOMI	<i>Nolina microcarpa</i>	59–118	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	59–118	–
13	yucca			34–56	
	soapweed yucca	YUGL	<i>Yucca glauca</i>	36–59	–
14	misc shrubs deciduous			34–56	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	36–59	–

Animal community

Wildlife: This ecological site provides habitat which support a resident animal community that is characterized by pronghorn antelope, blacktail jackrabbit, spotted ground squirrel, plains pocket mouse, southern plains woodrat, horned lark, scaled quail, roundtailed horned lizard, and ornate box turtle.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations

Cardenas -----D

Kolar-----D

Recreational uses

Recreational potential is limited. The suitability for camping, picnicking, and hiking is poor to fair, and limited by lack of surface water and shade. Hunting is good for quail, antelope, dove, and small game. Aesthetic appeal is enhanced by "wide open spaces". The natural beauty of the site is enhanced by the variety of plants that bloom from early spring to late fall following significant precipitation events.

Wood products

No significant potential for wood products.

Other products

Grazing: This site is suitable for grazing by all kinds and classes of livestock during all seasons of the year. Approximately 80 percent of the total yield is 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, sideoats grama, black grama, New Mexico feathergrass, and sand bluestem to decrease. Species most likely to invade the site include annual forbs, western ragweed, mesquite, and oneseed juniper. Species most likely to increase are blue grama, hairy grama, sand muhly, threeawn, sand dropseed, skunkbush sumac, catclaw acacia, and sacahuista. As the ecological condition deteriorates, it is accompanied by a sharp increase of blue grama. Most of the tall- and mid-grasses will disappear as deterioration advances. In some areas, there will be large patches of skunkbrush sumac, catclaw acacia, or sacahuista that will increase to the point of dominating the site. Deteriorating condition is accompanied by a net loss of plant cover, which causes wind erosion hazard and a loss of productivity.

A system of deferred grazing which varies the time of grazing and rest in pastures during successive years is needed to maintain or improve the plant community. Rest during April, May, and June benefits cool season species such as New Mexico feathergrass and early forbs. Late spring and summer rest is needed for little bluestem, sideoats grama, and sand bluestem to grow and reproduce. Winter rest is mainly beneficial to black grama. Cattle show a definite preference to black grama during the late winter, and this grass can easily be over-utilized. Winter rest will reduce the grazing pressure on black grama.

Other information

Guide to suggested initial stocking rates - acres per animal unit month

Similarity index-----acres per aum

100 to 76-----2.5 to 3.8

75 to 51-----3.5 to 5

50 to 26-----4.6 to 8

25 or less-----8 plus.

Type locality

Location 1: De Baca County, NM

Other references

References

1. U.S. Department of Agriculture, Natural Resources Conservation Service. 2001. Soil Quality Information Sheets. Rangeland Soil Quality—Erosion. Rangeland Sheets 9 & 10. Available at: <http://www.statlab.iastate.edu/survey/SQI/range.html>

2. Van Dyne, G.M., G.F. Payne, compilers. 1964. Grazing responses of western range plants. Bozeman, MT: Montana State College, Department of Animal and Range Sciences. 69 p.

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	05/04/2024
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):**
-
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:**
-