Ecological site R070BC001NM
Gravelly

Accessed: 05/11/2025

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site is on erosion remnants, piedmont slopes, fan piedmonts, inset fans, fan terraces. The parent material consists of calcareous alluvium, gravelly alluvium, and alluvium from igneous rock. Depth to the root restrictive layer ranges more than 60 inches. The Missile, Philder and torriorthents have shallow or moderately deep petrocalcic layer. Slope range from 1 to 15 percent. Elevations range fro 2,840 to 4,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Terrace (3) Alluvial fan
Flooding frequency	None
Ponding frequency	None
Elevation	3,600–5,300 ft
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the area is “semi-arid continental”. The average annual precipitation ranges from 8 to 13 inches. Variations of 5 inches, more or less, are common. Over 80 percent of the precipitation falls from April through October. Most of the summer precipitation comes in the form of high intensity – short duration thunderstorms. Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature is 61 degrees with extremes of 25 degrees below zero in the winter to 112 degrees in the summer.

The average frost free season is 207 to 220 days. The last killing frost is late March or early April, and the first killing frost is in late October or early November.

Temperature and rainfall both favor warm season perennial plant growth. In years of abundant spring moisture, annual forbs and cool season grasses can make up an important component of this site. The vegetation on this site

can take advantage of moisture at any time of year or amount of precipitation. Because of the soil texture and profile, water cannot be stored for long periods of time. Strong winds from the southwest blow from January through June which accelerates soil drying at a critical time for cool season plant growth.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% 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)	221 days
Freeze-free period (average)	240 days
Precipitation total (average)	13 in

Influencing water features

This site is not influenced from water from wetlands or streams.

Soil features

Soils are are are moderately deeep to deep. Surface textures range from gravelly loam, gravelly fine sandy loam, very gravelly loam, very gravelly loam, very gravelly fine sandy loam or gravelly sandy loam.

Subsurface textures are extreamly gravelly sandy loam, extreamly gravelly loam, extreamly gravelly silt loam, gravelly loam, gravelly fine sandy loam, very gravelly loam, very gravelly loam, very gravelly fine sandy loam or gravelly sandy loam.

Substratum textures are extreamly gravelly sandy loam, extreamly gravelly loam, extreamly gravelly silt loam, gravelly loam, gravelly fine sandy loam, very gravelly loam, very gravelly loam, very gravelly fine sandy loam or gravelly sandy loam.

Because of the skeletal nature of this soil, this site has a high water erosion potential and a droughty appearance.

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

Characteristic soils:
Bascal
Chaparral
Crossen *
Infantry *
Mariola *
Missile *
Philder *
Sonic
Yturbide *

Note: * soils have shallow or moderately deep to petrocalcic.

Table 4. Representative soil features

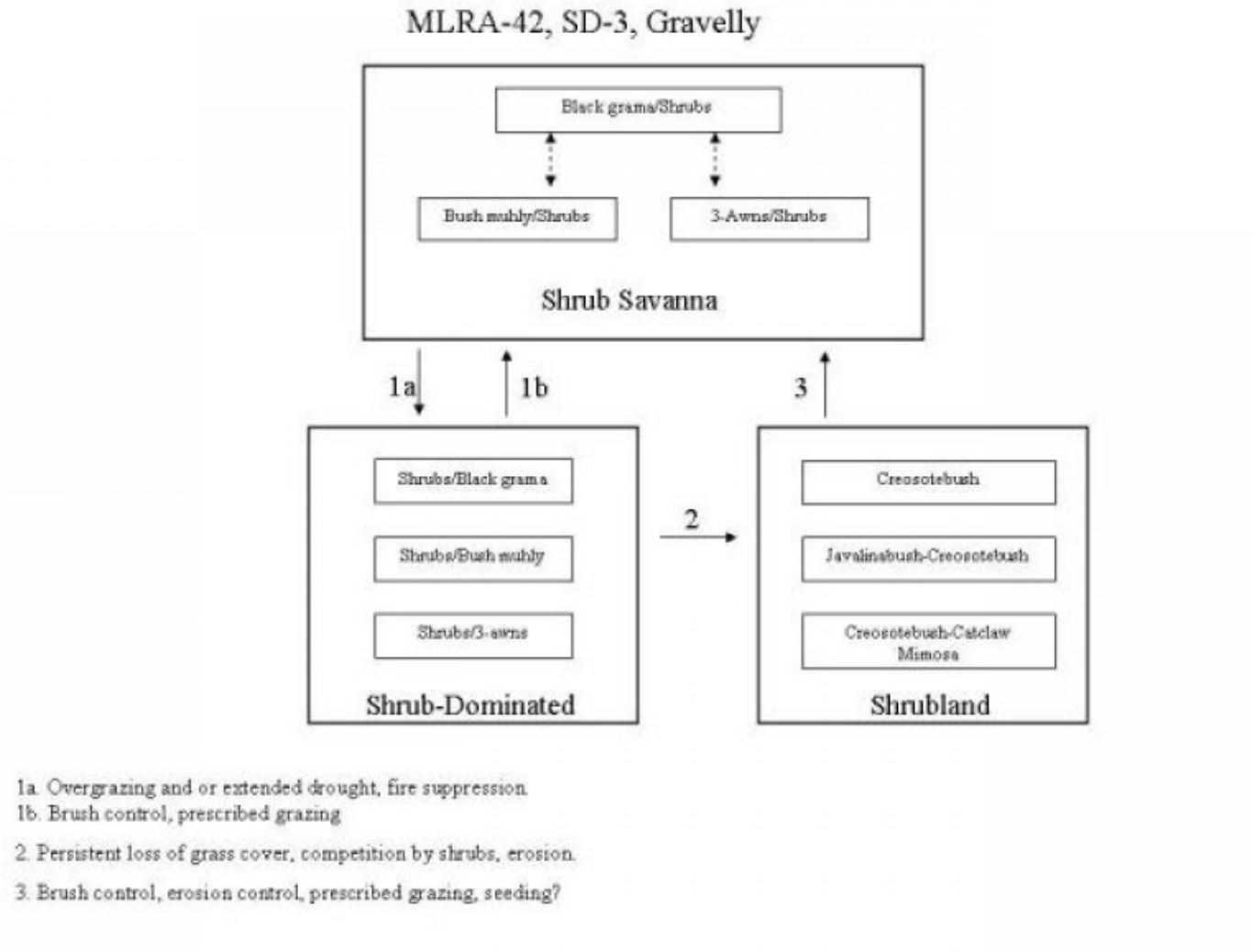
Surface texture	(1) Gravelly loam (2) Gravelly fine sandy loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained to moderately well drained
Permeability class	Slow to moderately rapid

Soil depth	20–80 in
Surface fragment cover <=3"	15–30%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	1–5 in
Calcium carbonate equivalent (0-40in)	10–45%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–1
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	8–45%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

Overview
The Gravelly site is associated with Limestone Hills, Draw, Loamy, and Sandy sites. On piedmont slopes, the Gravelly site is often associated with Limestone Hills and Draw sites. Limestone Hills are topographically higher and can provide run-on water to Gravelly sites. Draw sites often dissect Gravelly sites. Loamy and Sandy sites can exist as components of a complex, or occur as distinct units adjacent to Gravelly sites. On alluvial terraces, Loamy and Sandy sites typically occupy the sideslopes and depressions while the Gravelly site occurs on the ridges of the terrace. The historic plant community of the Gravelly site has the aspect of a grassland/shrub mix, dominated by grasses, with shrubs scattered and evenly distributed. Black grama is the dominant grass species. Winterfat, fourwing saltbush, and creosotebush are common shrubs. Overgrazing and or extended drought can reduce grass cover, effect a change in grass species dominance, and may result in a shrub-dominated state. Resource competition by shrubs, continued loss of grass cover, and resulting erosion may initiate the transition to a shrubland state.

State and transition model



State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Grassland/Shrub Mix: The historic plant community is dominated by black grama, with bush muhly, sideoats grama, and sand dropseed present as sub-dominants. Fourwing saltbush, winterfat, creosotebush, cactus species, and sacahuista are the dominant shrubs of the historic plant community. Retrogression within this state due to overgrazing is characterized by a decrease in black grama, sideoats grama, blue grama, Arizona cottontop, cane bluestem, plains bristlegrass, winterfat, and fourwing saltbush. Black grama may eventually become co-dominant or sub-dominant to secondary species such as bush muhly or threeawns. Retrogression due to drought can causes an overall decline in grass cover and production based on the species drought tolerance. The separation of impacts due to climate and grazing are difficult to determine. As grass cover declines due to drought, overgrazing, or a combination of the two, shrubs and the amount of bare ground increase and a shrub-dominated state may result Diagnosis: Grass cover is more or less uniformly distributed, however, surface gravel and bare ground make up a large percent of the total ground cover, and grass production during unfavorable years may only average 200 pounds per acre. Shrubs are common with canopy cover averaging five to seven percent. Rills and small gullies may be present, but are typically restricted to slopes greater than eight percent. Other grasses that could appear on this site would include: hairy grama, spike dropseed, burrograss, fluffgrass, vine-mesquite, New Mexico feathergrass, silver bluestem and ring muhly. Other woody plants include: common javalinabush, spiny allthorn, condalia, range ratany broom shakeweed, mariola, tesajo cactus, desert willow, Apacheplume and wolfberry. Other forbs include: bladderpod, senna, desert zinnia, wooly paperflower, prickleaf dogweed, stemless actinea, verbena and deerstongue.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	222	481	740
Shrub/Vine	54	117	180
Forb	24	52	80
Total	**300**	**650**	**1000**

Figure 5. Plant community growth curve (percent production by month). NM2801, R042XC001NM-Gravelly-Warm Season Plants-HCPC. SD-3 Gravelly HCPC Warm Season Plant Community.

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
Shrub Dominated

Community 2.1
Shrub Dominated

Shrub-Dominated: This state is characterized by an increase in shrubs and a decrease in grass cover. Across the range of soil types included in the Gravelly site, creosotebush is typically the dominant shrub, but it may occur as a co-dominant, or sub-dominant species with either catclaw mimosa or javelina bush. Black grama, bush muhly, or threeawns are often the dominant grass species. Tridens species, hairy grama, fluff grass, and burrograss increase in response to a decrease in black grama and bush muhly. Diagnosis: Shrubs are found at increased densities relative to the grassland/shrub mix, especially creosotebush, catclaw mimosa, or javelina bush. Grass cover is patchy with large connected bare areas present. Black grama may or may not be the dominant grass. Rills and gullies may be common and actively eroding. Transition to Shrub-Dominated (1a) Overgrazing and or extended periods of drought, and suppression of natural fire regimes are thought to cause this transition. Decreases in grass cover give a competitive advantage to shrubs and shrub seedling establishment. Shrubs are better equipped to withstand prolonged periods of drought due to the ability of their root systems to extract water from a larger area than grasses. Key indicators of approach to transition: 1. Decrease or change in composition or distribution of grass cover. 2. Increase in size and frequency of bare patches. 3. Increase in amount of shrub seedlings. Transition back to Grassland/Shrub Mix (1b) Brush control is necessary to re-establish grass dominance. Prescribed grazing will help to ensure proper forage utilization and sustain grass cover. Periodic use of prescribed fire may help in maintaining a grass-shrub mix.

State 3
Shrubland

Community 3.1
Shrubland

Shrubland State: This state is characterized by very little grass cover, extensive dominance of shrubs, and accelerated erosion. Creosotebush is typically the dominant shrub, but it does occur as a co-dominant, or sub-dominant species with either catclaw mimosa or javelina bush. Hairy tridens, hairy grama, fluffgrass, or threeawns may become the dominant grasses. Diagnosis: Grass cover is sparse and often restricted to the nutrient stable soils of shrub bases, with very little remaining in shrub interspaces. Shrub cover is high (>25%). Wind and water erosion is evident by the presence of pedestals and terracettes. Rills and gullies may also be common and actively eroding. Transition to Shrubland State (2) Persistent loss of grass cover and competition between shrubs and remaining grasses for resources may drive this transition. Reductions in grass cover reduce infiltration, decreasing available soil moisture necessary for grass seedling establishment. Accelerated erosion due to loss of grass cover can relocate organic matter and nutrients from shrub interspaces and concentrate them around shrub bases.2 This relocation of resources further increases shrubs competitive advantage. Key indicators of approach to transition: 1. Increase in size and frequency of bare patches. 2. Loss of grass cover in shrub interspaces. 3. Increased signs of erosion. Transition back to Grassland/Shrub Mix (3) Erosion control methods such as shaping and filling gullies, net

wire diversions, rock and brush dams, etc. may be needed to curtail erosion and restore site hydrology. Brush control will be necessary to overcome competition between shrubs and grass seedlings. Seeding may expedite recovery or may be necessary if an adequate seed source is no longer remaining. Prescribed grazing will help ensure adequate deferment and proper forage utilization following grass establishment. The degree to which this site is capable of recovery depends on the restoration of hydrology, extent of degradation to soil resources, and adequate rainfall necessary to establish grasses.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm Season**			163–228	
	black grama	BOER4	*Bouteloua eriopoda*	163–228	–
2	**Warm Season**			33–65	
	bush muhly	MUPO2	*Muhlenbergia porteri*	33–65	–
3	**Warm Season**			33–65	
	sideoats grama	BOCU	*Bouteloua curtipendula*	33–65	–
4	**Warm Season**			33–65	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	33–65	–
	Arizona cottontop	DICA8	*Digitaria californica*	33–65	–
5	**Warm Season**			13–33	
	blue grama	BOGR2	*Bouteloua gracilis*	13–33	–
6	**Warm Season**			13–33	
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	13–33	–
7	**Warm Season**			13–33	
	threeawn	ARIST	*Aristida*	13–33	–
8	**Warm Season**			13–33	
	tobosagrass	PLMU3	*Pleuraphis mutica*	13–33	–
9	**Warm Season**			33–65	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	33–65	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	33–65	–
10	**Warm Season**			13–33	
	ear muhly	MUAR	*Muhlenbergia arenacea*	13–33	–
11	**Warm Season**			13–33	
	tridens	TRIDE	*Tridens*	13–33	–
12	**Warm Season**			33–65	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	33–65	–
Shrub/Vine					
13	**Shrub**			7–20	
	littleleaf sumac	RHMI3	*Rhus microphylla*	7–20	–
14	**Shrub**			7–20	
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	7–20	–
15	**Shrub**			13–33	
	creosote bush	LATR2	*Larrea tridentata*	13–33	–

16	**Shrub**			7–20	
	jointfir	EPHED	*Ephedra*	7–20	–
17	**Shrub**			7–13	
	American tarwort	FLCE	*Flourensia cernua*	7–13	–
18	**Shrub**			20–33	
	winterfat	KRLA2	*Krascheninnikovia lanata*	20–33	–
19	**Shrub**			20–33	
	fourwing saltbush	ATCA2	*Atriplex canescens*	20–33	–
20	**Shrub**			7–20	
	yucca	YUCCA	*Yucca*	7–20	–
21	**Cactus**			13–33	
	pricklypear	OPUNT	*Opuntia*	13–33	–
22	**Shrub**			13–33	
	sacahuista	NOMI	*Nolina microcarpa*	13–33	–
23	**Other Shrubs**			13–33	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	13–33	–
Forb					
24	**Forb**			7–20	
	leatherweed	CRPOP	*Croton pottsii var. pottsii*	7–20	–
25	**Forb**			7–20	
	woolly groundsel	PACA15	*Packera cana*	7–20	–
26	**Forb**			13–33	
	bastardsage	ERWR	*Eriogonum wrightii*	13–33	–
27	**Forb**			7–20	
	globemallow	SPHAE	*Sphaeralcea*	7–20	–
28	**Other Forbs**			13–33	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	13–33	–

Animal community

This Ecological Site provides habitats which support a resident animal community that is characterized by desert cottontail, spotted ground squirrel, Merriam’s kangaroo rat, cactus mouse, white-throated woodrat, gray fox, spotted skunk, roadrunner, Swainson’s hawk, white-necked raven, cactus wren, pyrrhuloxia, lark sparrow, mourning dove, scaled quail, leopard lizard, round-tailed horned lizard, prairie rattlesnake, Couch’s spadedfoot toad, marbled whiptail, and greater earless lizard.
Where associated with Limestone Hills, mule deer utilize this site. Where large woody shrubs occur, most resident birds and scissor-tailed flycatcher, morning dove, lark sparrow and Swainson’s hawk nest.

Hydrological functions

Runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups

Soils Hydrologic Group
Bascal B
Chaparral B
Crossen C
Infantry D

Mariola C
Missile D
Philder D
Sonic B
Yturbide D

Recreational uses

This site offers recreation potential for hiking, horseback riding, rock hunting, nature photography and bird watching and hunting. During years of abundant spring moisture, a colorful array of wild flowers is displayed during May and June. A few summer and fall flowers also occur.

Wood products

There are no significant wood products that occur on this site.

Other products

Grazing
This site is suitable for grazing by all kinds and classes of livestock during all seasons of the year. Mismanagement of this site will cause a decrease in plants such as black, blue and sideoats grama, Arizona cottontop, cane bluestem, plains bristlegrass, winterfat and fourwing saltbush. This will be followed by an increase in bare ground and an increase in plants such as threeawns, muhly spp., fluffgrass, burrograss, catclaw mimosa, creosotebush, cactus, mesquite, American tarbush and yucca. Due to the soils on this site, the plant community takes advantage of the rainfall quickly. The livestock operation needs to be flexible enough to take advantage of this response, either by grazing or deferment. This site responds best to a system of grazing that rotates the season of use.

Other information

Guide to Suggested Initial Stocking Rate - Acres per Animal Unit Month - Ac/AUM
Similarity Index Ac/AUM
100 – 76 3.5 – 4.5
75 – 51 4.1 – 5.5
50 – 26 5.3 – 9.5
0 – 25 9.0 - +

Inventory data references

Data collection for this site was done in conjunction with the progressive soil surveys within the Southern Desertic Basins, Plains and Mountains, Major Land Resource Areas of New Mexico. This site has been mapped and correlated with soils in the following soil surveys. Eddy County, Lea County, and Chaves County.

Other references

Other References:

1. Humphrey, R.R. 1974. Fire in the deserts and desert grassland of North America. In: Kozlowski, T. T.; Ahlgren, C. E., eds. Fire and ecosystems. New York: Academic Press: 365-400.

2. U.S. Department of Agriculture, Natural Resources Conservation Service. 2001. Soil Quality Information Sheets. Rangeland Soil Quality—Erosion. Rangeland Sheet 9 & 10 [Online]. Available: http://www.statlab.iastate.edu/survey/SQI/range.html

Contributors

David Trujillo
Don Sylvester

Mark Moseley

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	
Approved by	
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:**
