Ecological site R042BB019NM
Limy, Desert Shrub

Accessed: 05/12/2025

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 occurs on slightly concave slopes or nearly level gently sloping to undulating piedmont slopes, drained lake beds, or alluvial fans or fan remnent. The soils formed in medium and moderately fine textured material high in carbonates that is mostly of alluvial or lacustrine origin with small amounts of eolian material. Slopes range form 1 to 5 percent on the averae, the masonfort soil may have slopes up to 15 percent, but usually average less than 5 percent. Elevations range from about 3,800 to 5,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Fan remnant (3) Fan piedmont
Flooding frequency	None
Ponding frequency	None
Elevation	3,800–5,000 ft
Slope	1–5%
Aspect	Aspect is not a significant factor

Climatic features

Annual average precipitation ranges from 7.35 to 11.90 inches. Wide fluctuations from year to year are common, ranging from a low of about 2 inches to a high of over 20 inches. At least one-half of the annual precipitation comes in the form of rainfall during July, August, and September. Precipitation in the form of snow or sleet averages less than 4 inches annually. The average annual air temperature is about 60 degree F. Summer maximums can exceed 100 degrees F. and winter minimums can go below zero. The average frost-free season exceeds 200 days and extends from April 1 to November 1. Both the temperature regime and rainfall distribution favor warm-season perennial plants on this site. Spring moisture conditions are only occasionally adequate to cause significant growth during this period of year. High winds from the west and southwest are common from March to June, which further tends to create poor soil moisture conditions in the springtime.

Climate data was obtained from
http://www.wrcc.dri.edu/summary/climsmnm.html

Table 3. Representative climatic features

Frost-free period (average)	205 days
Freeze-free period (average)	227 days
Precipitation total (average)	12 in

Influencing water features

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

Soil features

The soils of this site are deep to very deep. The surface layer is a calcareous loam, fine sandy loam, silty clay loam or clay loam containing less than 15 percent gravel. The substratum is a loam, clay loam, sandy clay loam and may have a weakly cemented calcium layer above the very strongly to a carbonatic layer to a depth of 60 inches or more.

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

Characteristic Soils:
Jal
Karro
Masonfort
turney

Table 4. Representative soil features

Surface texture	(1) Loam (2) Gravelly sandy loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately rapid to moderately slow
Soil depth	0–60 in
Surface fragment cover <=3"	0–7%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2–7 in
Calcium carbonate equivalent (0-40in)	7–60%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%

Subsurface fragment volume >3" (Depth not specified)	0–1%

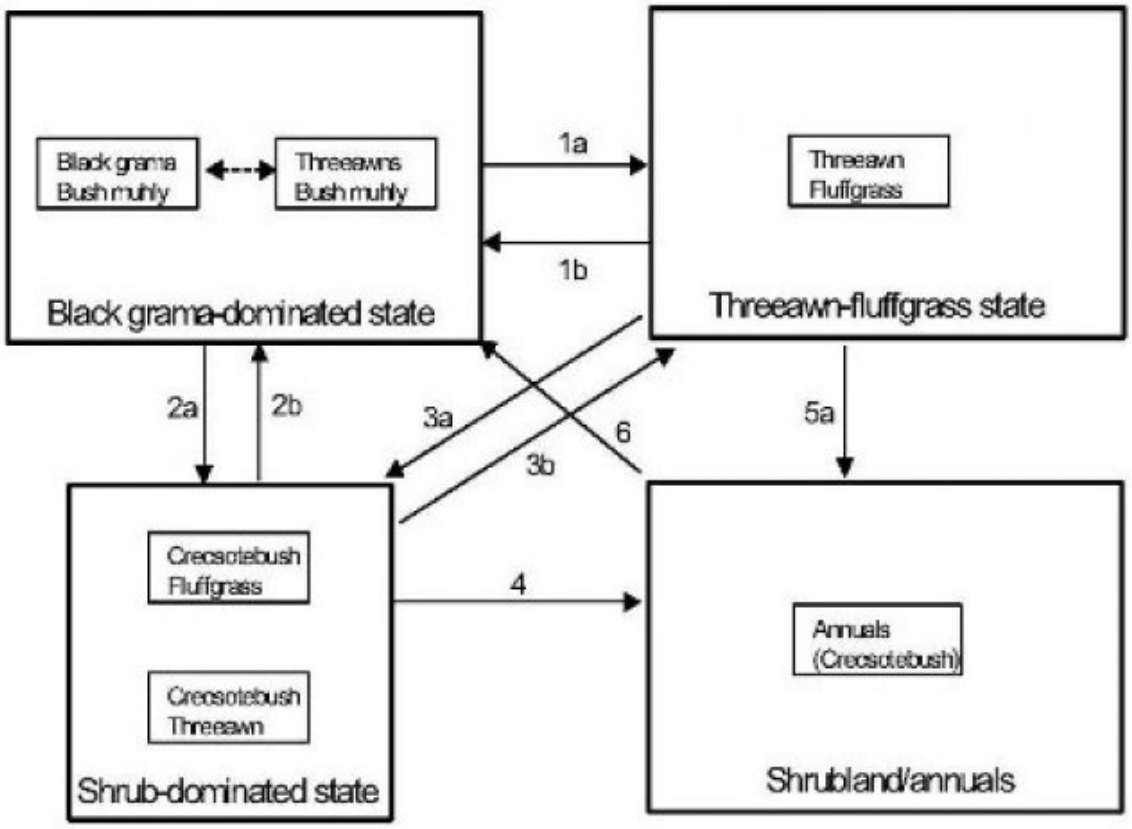
Ecological dynamics

Overview This ecological site is associated with gravelly and loamy ecological sites. Limy sites are uncommon in SD-2. The principal ecological feature separating this site from sandy and loamy sites is the high amount of calcium carbonate throughout the profile and the presence of a white, calcareous horizon within 10-20”. The high levels of calcium carbonate may reduce infiltration rates and inhibit the uptake of some nutrients (e.g. phosphorus; Lathja and Schlesinger 1988) so this site may be more stressful than sites of similar texture, and more easily subject to degradation. On the other hand, water that does penetrate may be held in the soil for longer periods than in soil of similar texture without high carbonate levels. In any case, the authors have been unable to locate limy soils harboring grassland. The historic plant community type is assumed to exhibit dominance by black grama (*Bouteloua eriopoda*) and secondarily bush muhly (*Muhlenbergia porteri*). Creosotebush (*Larrea tridentata*) and tarbush (*Flourensia cernua*) are present and annuals are important components. Loss of grasses due to overgrazing and/or drought, or due to climate change, may lead to a transition to dominance by shrubs. In other cases, shrubs may not increase and the community is dominated by threeawns (Aristida spp.) and fluffgrass (*Dasyochloa pulchella*). Persistent reductions of grass permits wind erosion, leading to loss of soil fertility, eventual loss of the A horizon, and exposure of the calcic horizon at which point only a few shrubs and annuals may persist.

No studies have been conducted on the ecology of the limy ecological site.

State and transition model

No studies have been conducted on the ecology of the limy ecological site.



1a. Overgrazing, soil fertility loss, erosion; 1b. Soil stabilization, seeding, soil modification.
2a. Shrub encroachment due to overgrazing or other factors; 2b. Shrub removal, restore cover
3a. Shrub encroachment; 3b. Shrub removal
4. Loss of perennial grasses due to drought, overgrazing, continued erosion
5a. Continued erosion, overgrazing, drought. 6. Soil addition, seeding.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Shrubland

• Creosotebusl
muhly plants
• Pedestalling
bush muhly in
other signs of
• Masonfort se

Figure 4. Shrubland

State Containing Historic Climax Plant Community Black grama-dominated state: The historic plant community is believed to have been dominated by black grama, bush muhly, threeawns, burrograss (*Scleropogon brevifolius*) and sand dropseed (*Sporobolus cryptandrus*). Annuals are especially dominant at certain times depending on rainfall. Creosotebush, mormon tea (Ephedra spp.), and tarbush are present. Grazing-induced change from this community would be characterized by a reduction in the cover of black grama, bush muhly and dropseeds, and an increase in the proportional representation of threeawns, fluffgrass, shrubs, and annuals. Diagnosis: Black grama is dominant and the density of shrubs is low. Evidence of erosion is infrequent. Transition to threeawn-fluffgrass state (1a): The cause of this transition is presumably due to poor grazing management or other soil disturbance, possibly in combination with drought. Erosion and degradation of the A horizon may reduce the ability of black grama and bush muhly to establish and spread. Transition to shrub-dominated state (2a): The cause of this transition is presumably due to poor grazing management that reduces competition of grasses with shrubs, climate change, or perhaps reduced fire frequencies. Key indicators of approach to transitions: Increases in bare ground, decreases in black grama and bush muhly cover, possibly increased germination of creosotebush (2a).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	142	275	408
Shrub/Vine	32	62	92
Forb	26	51	75
Total	**200**	**388**	**575**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0%
Grass/grasslike basal cover	15%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	3%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	67%

Figure 6. Plant community growth curve (percent production by month). NM2510, R042XB019NM-Limy-Warm season plant HCPC. SD-2 warm season plant community..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	10	25	30	15	5	0	0

State 2
Threeawn-Fluffgrass

Community 2.1
Threeawn-Fluffgrass

Additional States: Threeawn-fluffgrass state: Threeawns, fluffgrass, and annuals dominate in this state. Overall herbaceous cover is low and shrubs are not abundant. It is not understood why shrubs do not come to dominate

within this state. Black grama may be eliminated and bush muhly may occur at the bases of shrubs. Diagnosis: Bare ground is interconnected, and threeawn and other grass cover is patchy or scattered. Fluffgrass may be abundant. Shrubs are present, but are not dominant. Evidence of erosion, including gullies, rills, pedestalling, and water flow patterns may be apparent. Transition to shrub-dominated state (3a): This may occur if shrub densities increase following the loss of dominant perennial grasses, perhaps due to favorable rainfall patterns. Key indicators of approach to transitions: Increased germination of creosotebush. Transition to shrubland/annuals state (5a): The remaining grass patches are lost due to drought and/or disturbance to grasses by grazing or off-road vehicle use. It is possible that most cases of threeawn-fluffgrass states eventually degrade to annual states due to soil burial of grasses, which is caused by wind erosion from large bare patches, in addition to erosion at grass edges. Key indicators of approach to transitions: Increases in bare ground, evidence of erosion around grass patches and plants (pedestalling), decadence of remaining grasses, decreases in grass cover. Transition to black grama-dominated state (1b): This might be achieved by nutrient amendments to the soil and/or seeding during periods of above-average summer rainfall. Deferred grazing would probably be necessary.

State 3
Shrub-Dominated

Community 3.1
Shrub-Dominated

Shrub-dominated state: This state is characterized by the persistent dominance of creosotebush and other shrubs, including mesquite (*Prosopis glandulosa*). Threeawns may be the grass dominants and black grama and bush muhly are present in some patches. Fluffgrass may be an important component. Diagnosis: Creosotebush, tarbush, and mesquite are dominant and grass occurrence is patchy. Evidence of erosion, including gullies and rills, are apparent in bare areas. Transition to shrubland/annual state (4): As for 5a above, except that shrubs persist as the sole perennial dominants. Key indicators of approach to transitions: Increases in bare ground, evidence of erosion around grass patches and plants (pedestalling), decadence of grasses, decreases in grass cover. Transition to black grama-dominated state (2b): If competition with shrubs for water and/or nutrients reduces grass dominance in many patches, then shrub control may facilitate black grama and bush muhly reestablishment and vegetative growth. If climatic conditions are not suitable for grass growth then such treatments will be ineffective. Transition to threeawn-fluffgrass state (3b): Shrub removal may not result in recovery of black grama or bush muhly if moderate soil degradation has occurred, or if seeds of these species are not present. Instead, threeawns may proliferate or simply become the default dominants without increasing in cover.

State 4
Shrubland / Annuals

Community 4.1
Shrubland / Annuals

Shrubland/annuals: Shrubs, especially creosotebush, are dominant perennials and annuals may be periodically abundant. In other cases, shrubs are not abundant. Grasses are rare or absent. Erosion is severe. Diagnosis: Perennial grasses are rare, shrubs may be the sole perennial cover. Evidence of erosion, especially pedestalling of shrubs and gullies, is apparent throughout the site. Transition to black-grama-dominated state (6): Shrub removal, the placement of physical structures to collect water or retard erosion, and/or nutrient amendments and seeding may result in recovery of perennial grasses over a period of decades or more. It is possible that only threeawns would recover, in which case the site would recover to the threeawn-fluffgrass state. Data and information sources and theoretical background: Communities and states are derived largely from Jim Powell, NRCS, retired and infrequent observations by Brandon Bestelmeyer, USDA-ARS Jornada Experimental Range.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				116–155	

	black grama	BOER4	*Bouteloua eriopoda*	116–155	–
2				19–39	
	bush muhly	MUPO2	*Muhlenbergia porteri*	19–39	–
3				12–31	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	12–31	–
4				4–19	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	4–19	–
	Arizona cottontop	DICA8	*Digitaria californica*	4–19	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	4–19	–
5				4–19	
	tobosagrass	PLMU3	*Pleuraphis mutica*	4–19	–
6				19–39	
	threeawn	ARIST	*Aristida*	19–39	–
	burrograss	SCBR2	*Scleropogon brevifolius*	19–39	–
7				4–19	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	4–19	–
8				4–12	
	Grass, annual	2GA	*Grass, annual*	4–12	–
9				4–12	
	Grass, perennial	2GP	*Grass, perennial*	4–12	–
Shrub/Vine					
10				4–19	
	American tarwort	FLCE	*Flourensia cernua*	4–19	–
	creosote bush	LATR2	*Larrea tridentata*	4–19	–
11				4–12	
	crown of thorns	KOSP	*Koeberlinia spinosa*	4–12	–
12				4–12	
	littleleaf ratany	KRER	*Krameria erecta*	4–12	–
	mariola	PAIN2	*Parthenium incanum*	4–12	–
13				4–12	
	soaptree yucca	YUEL	*Yucca elata*	4–12	–
14				4–12	
	fourwing saltbush	ATCA2	*Atriplex canescens*	4–12	–
15				4–12	
	jointfir	EPHED	*Ephedra*	4–12	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	4–12	–
16				4–12	
	winterfat	KRLA2	*Krascheninnikovia lanata*	4–12	–
Forb					
17				12–19	
	dwarf desertpeony	ACNA2	*Acourtia nana*	12–19	–
	croton	CROTO	*Croton*	12–19	–
	touristplant	DIWI2	*Dimorphocarpa wislizeni*	12–19	–
	buckwheat	ERIOG	*Eriogonum*	12–19	–

	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	12–19	–
	Russian thistle	SAKA	*Salsola kali*	12–19	–
18				19–39	
	Forb, annual	2FA	*Forb, annual*	19–39	–
	Forb, perennial	2FP	*Forb, perennial*	19–39	–

Animal community

This site provides habitat which support a resident animal community that is characterized by pronghorn antelope, badger, desert pocket mouse, bannertail kangaroo rat, southern plains woodrat, marsh hawk, loggerhead shrike, black-throated sparrow, meadowlark, Texas horned lizard, western hognose snake, couch's spadefoot toad and Woodhouse's toad.

Hydrological functions

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

Hydrologic Interpretations
Soil Series Hydrologic Group
Jal B
karro B
Turney B
Masonfort D

Recreational uses

Suitability for camping and picnicking is fair, and hunting is fair for pronghorn antelope, quail, dove, and small game. Photography and bird watching can be fair to good, especially during migration seasons. Most small animals of the site are nocturnal and secretive, seen only at night, early morning or evening. Scenic beauty is greatest during spring and sometimes summer months when flowering of forbs and shrubs occurs.

Wood products

This site has no significant value for wood products.

Other products

This site, at its potential, is suitable for grazing in all seasons of the year, although most of the green forage is produced during summer months. The site is suitable for grazing by all classes of livestock. In order to maintain and improve this site, grazing management that includes a flexible stocking rate is especially important.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index Ac/AUM
100 - 76 7.0 – 8.0
75 – 51 7.5 – 8.9
50 – 26 8.5 – 13.0
25 – 0 13.0 - +

Other references

Other 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. Sierra County Dona Ana County Grant County Hidalgo County Luna County Otero County

Characteristic Soils Are:
Jal fine sandy loam
Karro loam and silty clay loam, fine sandy loam

Contributors

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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:**