USDA Natural Resources Conservation Service

Ecological site R070BC030NM
Limy

Accessed: 05/17/2024

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on plains, alluvial fans, fan piedmont, adjacent to playa lake beds or playa rims. Slopes are 0 to 5 percent. Elevations range from 2,842 to 4,500 feet. The site is derived from calcareous mixed alluvium derived from sedimentary rock. Rock fragments range less than 10 percent.

Table 2. Representative physiographic features

Landforms	(1) Fan piedmont (2) Alluvial fan (3) Plain
Flooding frequency	None
Ponding frequency	None
Elevation	866–1,372 m
Slope	0–5%
Aspect	Aspect is not a significant factor

Climatic features

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 in late March or early April and the first killing frost in late October or early November.

Temperature and rainfall both favor warm season perennial plant growth. In years of abundant moisture, annual forbs and cool season grasses can make up an important component of the site. Strong winds blow from the west and southwest from January through June, which accelerate soil drying during a
critical period for cool season plant growth.

Table 3. Representative climatic features

Frost-free period (average)	221 days
Freeze-free period (average)	240 days
Precipitation total (average)	330 mm

Influencing water features

This site is not inflenced by wetlands or streams.

Soil features

Soils are deep and very deep. Surface layers are fine sand, very fine sand, silty clay loam, very fine sandy loam, clay loam and loam. Subsoil textures are loam, clay loam, silty clay loam, sandy clay loam or silt loam. Depth to calcic horizon: 10 to 24 inches, and calcium carbonate equivalent is averaging more than 40 percent. Permeability is moderate and the available water holding capacity is moderate. Because of the high lime content and rather moderately coarse surface textures, the soils are easily windblown if not protected by vegetation.

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

Characteristic soils:
Karro
Armesa
Jal

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Very fine sandy loam (3) Silty clay loam
Family particle size	(1) Sandy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately slow
Soil depth	152–183 cm
Surface fragment cover <=3"	2–11%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	25–50%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	7.9–9

Subsurface fragment volume <=3" (Depth not specified)	1–15%
Subsurface fragment volume >3" (Depth not specified)	0%

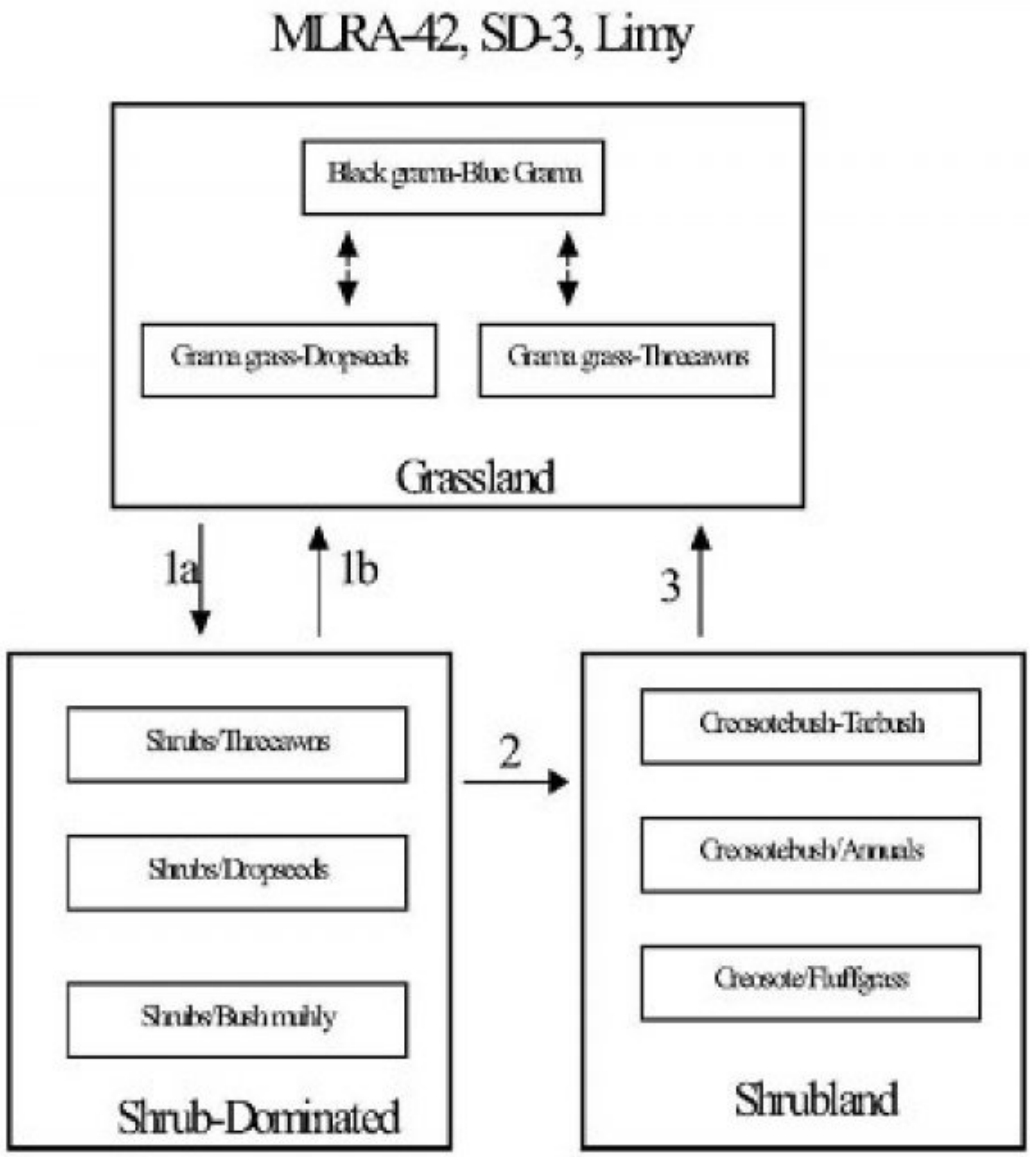
Ecological dynamics

The Limy site occurs on nearly level or slightly concave upland plains, fans, and terraces, or adjacent to playa lakebeds. The Limy site can occur as a distinct unit adjacent to, or as part of, a mosaic with Loamy, Sandy, and Shallow Sandy sites. A soil layer high in lime, of soft or weakly cemented calcium carbonate, usually within two feet of the soil surface, distinguishes the Limy site. The historic plant community of the Limy site exhibits a grassland aspect, with shrubs and
half shrubs noticeable and evenly scattered. Grasses account for approximately 65 to 80 percent of the total potential production. Black grama and blue grama are the dominant grass species. Yucca, winterfat, and ephedra are common shrubs. Overgrazing and/or extended drought can reduce grass cover, effect a change in grass species dominance, and may result in a shrubdominated state. Decreased fire frequency may also play a key role in the transition to shrub dominance.

1 Resource competition by shrubs, continued loss of grass cover, and resulting erosion
may initiate the transition to a shrubland state.

State and transition model

Plant Communities and Transitional Pathways (diagram)



1a. Loss of grass cover due to overgrazing or drought, decreased fire frequency.
1b. Brush control, prescribed grazing.

2.Continued loss of grass cover, competition by shrubs, erosion.

3. Brush control, range seeding, prescribed grazing.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

Grassland: The historic plant community is dominated by black, and blue grama. Black grama densities tend to be

highest on soils with sandy loam surface textures, and blue grama on soils with loam surface textures. Bush muhly, hairy grama, plains bristlegrass, and sand dropseed also occur in significant amounts. Yucca, winterfat, and ephedra species are the dominant shrubs of the historic community. Fourwing saltbush, creosotebush, tarbush, and broom snakeweed typically occur as sub-dominants. Threadleaf groundsel, wooly groundsel, Leatherweed croton, and bladderpod are forbs commonly found across the site. Extended periods of drought, or drought in combination with heavy grazing can cause a decrease in plants such as black grama, blue grama, bush muhly, vine mesquite, Arizona cottontop, winterfat, and fourwing saltbush. Dropseeds and threeawns may increase in representation and become co-dominant to black or blue grama. Dropseeds and threeawns produce ample viable seed and are not as palatable as either black or blue grama, especially during the dormant season. Threeawns can take advantage of early spring, as well as summer moisture, enabling it to quickly establish following drought. Creosotebush, tarbush, broom snakeweed, fluffgrass and burrograss increase with further site degradation. This increase in shrubs and associated loss of grass cover, perhaps in conjunction with decreased fire frequency may result in a shrub-dominated state. Diagnosis: Black grama and blue grama are the dominant grasses. Grass cover is uniformly distributed with few large bare areas. Yucca, winterfat, and ephedra species are the dominant shrubs. Fourwing saltbush is present.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	426	788	1150
Shrub/Vine	67	124	182
Forb	67	124	182
Total	**560**	**1036**	**1514**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	20-30%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	12-15%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	25-35%

Figure 5. Plant community growth curve (percent production by month). NM2830, R042XC030NM Limy HCPC. R042XC030NM Limy HCPC Mixed grass-shrub plant community.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	4	8	10	25	30	15	5	0	0

State 2
Shrub Dominated

Community 2.1
Shrub Dominated

This state is characterized by an increase in shrubs and a decrease in grass cover. Creosotebush, tarbush, and broom snakeweed are the dominant shrubs. Dropseeds, threeawns or bush muhly are the dominant grasses. Retrogression within this state is characterized by a continued reduction in grass cover and an increase in the size and frequency of bare patches. Under heavy grazing pressure grass cover is higher in shrub interspaces when dropseeds or threeawns are the dominant grass, as opposed to bush muhly, whose cover tends to be higher under shrub canopies. This may be due to the forage value of bush muhly, low resistance to grazing, and its ability to successfully establish under creosotebush and tarbush.4 Diagnosis: Shrubs are found at increased densities relative to the grassland state, especially creosotebush, tarbush, and broom snakeweed. Grass cover is patchy with large (>2m) connected bare areas present. Black grama may or may not be present. Wind erosion is common and evidenced by pedestaling of plants and rocks in shrub interspaces. 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. If periodic fire played a role in naturally suppressing shrubs (especially creosotebush and tarbush), then decreased fire frequency may facilitate this transition. Key indicators of approach to transition: Increase in amount of dropseeds or threeawns Decrease or loss of winterfat and fourwing saltbush. Increase in size and frequency of bare patches. Transition back to Grassland (1b) Brush control is necessary to re-establish grass dominance. Prescribed grazing will help to ensure proper forage utilization following brush control and sustain grass cover. Periodic use of prescribed fire may help in maintaining the grassland state.

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, and tarbush often occurs as a sub-dominant. Herbaceous cover is very limited, often restricted to a sparse cover of fluffgrass or annual forbs and grasses scattered across the shrub interspaces, or scattered bush muhly in shrub bases. Diagnosis: Grass cover very sparse or absent in shrub interspaces. Fluffgrass or annuals may be the dominant herbaceous species. Erosion is evident by soil sealing, water flow patterns, pedestals or terracettes. Sub-surface soil horizons may be exposed. Transition to Shrubland State (2) Persistent loss of grass cover, associated erosion, and increased competition for resources by shrubs may cause a transition to a shrubland state. As grass cover diminishes, perhaps due to excessive grazing followed by drought, erosion rates increase. Erosion removes or re-distributes organic matter and available nutrients. As organic matter is lost, soil surfaces seal, reducing infiltration and available water. The relocation of resources from interspaces to shrub bases further increases shrubs competitive advantage. Key indicators of approach to transition: Increase in size and frequency of bare patches. Loss of grass cover in shrub interspaces. Increased signs of erosion—evidenced by pedestalling of plants, soil deposition on leeward side of plants, exposure of subsoil.2 Transition back to Grassland (3) 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 and benefits derived depends on the cost of restoration, extent of degradation to soil resources, and adequate rainfall necessary to establish grasses. 3 Depending on the extend of soil degradation, the length of time involved for a transition back to the Grassland state may take longer than the typical management timeframe.

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				104–156	
	black grama	BOER4	*Bouteloua eriopoda*	104–156	–
2				52–104	

	bush muhly	MUPO2	*Muhlenbergia porteri*	52–104	–
3				104–207	
	blue grama	BOGR2	*Bouteloua gracilis*	104–207	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	104–207	–
4				104–156	
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	104–156	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	104–156	–
5				31–52	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	31–52	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	31–52	–
6				31–52	
	threeawn	ARIST	*Aristida*	31–52	–
7				31–52	
	burrograss	SCBR2	*Scleropogon brevifolius*	31–52	–
8				31–52	
	Arizona cottontop	DICA8	*Digitaria californica*	31–52	–
	vine mesquite	PAOB	*Panicum obtusum*	31–52	–
9				31–52	
	Grass, perennial	2GP	*Grass, perennial*	31–52	–
Shrub/Vine					
10				52–104	
	yucca	YUCCA	*Yucca*	52–104	–
11				52–104	
	jointfir	EPHED	*Ephedra*	52–104	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	52–104	–
12				21–52	
	fourwing saltbush	ATCA2	*Atriplex canescens*	21–52	–
13				31–52	
	American tarwort	FLCE	*Flourensia cernua*	31–52	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	31–52	–
	creosote bush	LATR2	*Larrea tridentata*	31–52	–
14				21–52	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	21–52	–
Forb					
15				31–52	
	woolly groundsel	PACA15	*Packera cana*	31–52	–
	threadleaf ragwort	SEFLF	*Senecio flaccidus var. flaccidus*	31–52	–
16				21–52	
	leatherweed	CRPOP	*Croton pottsii var. pottsii*	21–52	–
17				21–52	
	bladderpod	LESQU	*Lesquerella*	21–52	–
18				21–52	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	21–52	–

Animal community

This site provides habitat which supports a resident animal community that is characterized by black-tailed jackrabbit, spotted ground squirrel, black-tailed prairie dog, yellow-faced pocket gopher, Merriam's dangaroo rat, hispid cotton rat, swift fox, burrowing owl, horned lark, meadowlark, lark bunting, scaled quail, greater earless lizard, leopard lizard, Texas horned lizard, Western spadefoot toad, prairie rattlesnake and Western coachwhip. The marsh hawk hunts over the site in winter, and long-billed curlew, and sandhill crane utilize playas associated with the site during migrations.

Hydrological functions

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

Hydrologic Interpretations
Soil Series Hydrologic Group
Jal-------- B
Armesa----- B
Karro------ B

Recreational uses

This site offers recreation potential for hiking, horseback riding, nature observation and photography, and quail, dove, antelope and predator hunting.

Wood products

This site produces no significant wood products.

Other products

This site is suitable for grazing during all seasons of the year by all kinds and classes of livestock. As this site deteriorates there will be a decrease in plants such as black grama, bush muhly, blue grama, vine-mesquite, Arizona cottontop, winterfat and fourwing saltbush. This will cause an increase in fluffgrass, burrograss, yucca, creosotebush, tarbush and broom snakeweed. There will also be an increase in bare ground. As vegetative cover is reduced the soil is very open to wind erosion. This site responds best to a system of management that rotates the season of use.

Other information

Other Information:
Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity------ Index Ac/AUM
100 - 76-------- 3.0 – 3.5
75 – 51--------- 3.4 – 4.8
50 – 26--------- 4.7 – 7.0
25 – 0---------- 7.1 +

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

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 Sheet. Rangeland Soil Quality—Wind Erosion. Rangeland Sheet 10. [Online]. Available: http://www.statlab.iastate.edu/survey/SQI/range.html

3.Vallentine, J.F. and J.J. Norris. 1964. A comparative study of soils of selected creosotebush sites in southern New Mexico. J. Range. Manage. 17: 23-32.

4. Welsh, R.G. and R.F. Beck. 1976. Some ecological relationships between creosotebush and bush muhly. Journal of Range Management 29:472-475.

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:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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:**
