Ecological site R042CY115NM
Breaks

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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.

MLRA notes

Major Land Resource Area (MLRA): 042C–Central New Mexico Highlands

Major Land Resource Area (MLRA): 070C–Central New Mexico Highlands Major Land Resource Area (MLRA) 70C - will become 42C - is a high elevation portion of central New Mexico that is the convergence of four major physiographic provinces: Basin and Range, Southern Rocky Mountains, Great Plains, and Colorado Plateau. As such, it contains parts or characteristics of each, though tectonically, as a region, it is the easternmost extent of the Basin and Range Province and, more specifically, a structural expression of the Rio Grande Rift. It consists mostly of rangeland with some forested areas associated with numerous disconnected mountain ranges such as the Guadalupe, Sacramento, and Manzano Mountains. Other major physiographic features include the Galisteo Basin or the enclosed Estancia Basin, the structural Chupadera and Glorieta Mesas, and the piedmonts of the Buchanan and Guadalupe Mesas.

Ecological site concept

The site occurs on very steep mountain escarpments with a rough, dissected topography. Slopes range from 40-95 percent. The site consists of very shallow or shallow, well drained, and moderately permeable soils over slowly permeable limestone bedrock.

Associated sites

F042CY020TX	**Limestone Mountain (North Aspect) 20-26" PZ** Limestone Mountain (North Aspect) is on steep north facing slopes mostly above 2,286 m in elevation. Soils are mostly shallow to limestone bedrock and clayey. The reference plant community is a mixed conifer forest.
F042CY021TX	**Limestone Mountain (South Aspect) 20-26" PZ** The Limestone Mountain (South Aspect) occurs on mountain slopes and ridgetops, at elevations generally above 2,286 m. Aspects are predominantly south facing or neutral. Soils are mostly shallow to limestone bedrock, gravelly, and loamy. The reference plant community is a ponderosa pine savanna.
R042CY102NM	**Shallow Limestone** Shallow Limestone occurs on limestone hills with 10 to 50 percent slope gradient. Soils are shallow to limestone bedrock. HCPC is mixed prairie grassland with scattered forbs, shrubs, and trees.
R042CY745TX	**Limestone Canyon Bottomland** Limestone Canyon is a flood plain, stream terrace, arroyo, or basin floor with very gravelly or cobbly soils. HCPC is mainly riparian woodlands but vegetation is variable due to different soil conditions.

R042AD001NM	**Loamy, Dry Mixed Prairie** Can be adjacent to and in a higher position.
R042CY109NM	**Loamy** Loamy is a flood plain, stream terrace, arroyo, or basin floor with nongravelly or cobbly soils. HCPC is mixed prairie grassland with scattered shrubs, forbs, and trees.

Similar sites

R042AE278TX	**Limestone Hill and Mountain, Mixed Prairie** More productive and site supports oak, juniper, and pinyon trees.
R042AC249TX	**Limestone Hill and Mountain, Desert Grassland** Less productive and lacks abundance of mesic grass species.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

The site occurs on very steep mountain escarpments with a rough, dissected topography. Aspect is mostly south, east, and west (90-270°). Elevation ranges from 4600-8700 feet. Slopes range from 40-95 percent and have a very high runoff potential. Exposed bedrock is common throughout the site. Species composition varies with elevation, aspect, and soil differences.

Table 2. Representative physiographic features

Landforms	(1) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	1,400 – 2,620 m
Slope	40 – 100 %
Aspect	E, S, W

Climatic features

The climate of the area is "semi-arid continental."

The average annual precipitation ranges from 13 to 16 inches. Variations of 5 inches, more or less, are not uncommon. Seventy-five percent of the precipitation falls from April to 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 about 50 degrees F with extremes of -29 degrees F in the winter and 103 degrees F in the summer.

The average frost-free season is 130 to 160 days. The last killing frost falling in early May and the first killing frost in early October.

Both temperature and precipitation favor warm-season perennial species. However, about 40 percent of the annual precipitation falls at a time favorable to cool-season plant growth. The soils of this site can store water from winter and early spring moisture for use by cool-season species. This allows the cool-season species to occupy an important component of this site. Strong wind from the west and southwest that blow from February to June can rapidly dry the soil profile during a critical period 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)	170 days
Freeze-free period (average)	190 days
Precipitation total (average)	410 mm

Influencing water features

This is an upland site, and is not associated with water features or wetlands. During heavy rain events, this site may receive run-on moisture from landforms above and contribute runoff to landforms below.

Soil features

The site consists of very shallow or shallow, well drained, and moderately permeable soils over slowly permeable limestone bedrock. Soils formed in both colluvium and residuum on mountain flanks and escarpments. Generally, the soils formed from colluvium are deeper and are more productive than those formed over residuum. All horizons have a high percentage of gravels and cobbles, averaging over 35 percent by volume. Typically, the surface layer is dark grayish brown and very gravelly clay loam about 7 inches thick. The underlying material from 7 to 17 inches is indurate limestone bedrock. The soil component and associated map unit correlated to this site is:

Guadalupe Mountains National Park Soil Survey Project:
Lostpeak-Rock outcrop complex, 40 to 95 percent slopes.

New Mexico:
TBD

Table 4. Representative soil features

Parent material	(1) Residuum – limestone (2) Colluvium – limestone

Surface texture	(1) Very gravelly clay loam (2) Stony loam (3) Stony silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	10 – 40 cm
Surface fragment cover <=3"	10 – 40 %
Surface fragment cover >3"	10 – 30 %
Available water capacity (0-101.6cm)	0 – 5.08 cm
Calcium carbonate equivalent (0-101.6cm)	40 – 80 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.9 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	30 – 40 %

Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

Ecological dynamics

The Breaks ecological site is characterized by several mountain shrub community potentials due to variability in elevation, soil depth and texture, aspect, and topography. Plant communities include a sotol with scattered wavyleaf oak, mountain mahogany dominated community, and a wavyleaf oak dominated community.

All communities tend to occur within one very stable state. The most influential driver affecting plant community dynamics is fire. Vegetation on this site, also referred to as chaparral, experiences stand-replacing fires measured in decades (Wright 1990; Paysen et al. 2000). The buildup of litter and dry conditions following a fire will take at least 10-15 years the area is ready to burn again (Wright 1990). Since chaparral tends to replace chaparral after fire, species composition can change depending on post-fire seed bank composition, individual species morphology, and severity of the fire (NPS 2005). Generally, the dynamic is from a more closed or dense shrubland to an open shrubland phase and vice versa within a stable state.

Other disturbances such as prolonged droughts will negatively affect annual productivity. Grazing and/or browsing by domestic sheep and goats probably does not influence the site enough to cause significant phase changes because of the long and near vertical escarpments with abundant rocks outcrops protecting vegetation and the long distance to water. Historically, desert bighorn sheep and mule deer were probably the major grazers/browsers. Mule deer still occur on the site and bighorn sheep are being reintroduced in nearby areas.

The following diagram suggests general pathways that the vegetation on this site might follow. There are other plant communities and states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances; it does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Midgrasses**			135-269	
	sideoats grama	BOCU	*Bouteloua curtipendula*	67-224	–
	little bluestem	SCSC	*Schizachyrium scoparium*	67-224	–
2	**Short/Midgrasses**			101-202	
	blue grama	BOGR2	*Bouteloua gracilis*	56-196	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	22-67	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	34-67	–
	common wolfstail	LYPH	*Lycurus phleoides*	22-67	–
3	**Shortgrasses**			202-404	
	New Mexico muhly	MUPA2	*Muhlenbergia pauciflora*	84-280	–
	bullgrass	MUEM	*Muhlenbergia emersleyi*	56-168	–
	curlyleaf muhly	MUSE	*Muhlenbergia setifolia*	34-67	–
	slimflower muhly	MUTE	*Muhlenbergia tenuiflora*	34-67	–
	pine muhly	MUDU	*Muhlenbergia dubia*	34-67	–
4	**Shortgrasses**			34-67	
	black grama	BOER4	*Bouteloua eriopoda*	45-101	–
	slim tridens	TRMU	*Tridens muticus*	11-34	–

	threeawn	ARIST	*Aristida*	11-34	–
5	**Cool-season bunchgrasses**			67-135	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	50-112	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	6-34	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	6-34	–
	needle and thread	HECO26	*Hesperostipa comata*	6-34	–
Shrub/Vine					
6	**Dominant Shrubs**			488-942	
	pungent oak	QUPU	*Quercus pungens*	448-897	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	224-785	–
	desert ceanothus	CEGR	*Ceanothus greggii*	112-448	–
	plains lovegrass	ERIN	*Eragrostis intermedia*	45-135	–
7	**Subdominant Shrubs**			247-471	
	resinbush	VIST	*Viguiera stenoloba*	56-140	–
	fragrant sumac	RHAR4	*Rhus aromatica*	28-112	–
	eggleaf silktassel	GAOV	*Garrya ovata*	28-112	–
	algerita	MATR3	*Mahonia trifoliolata*	28-112	–
	Rio Grande saddlebush	MOSC	*Mortonia scabrella*	28-112	–
	mariola	PAIN2	*Parthenium incanum*	28-112	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	45-90	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	45-90	–
	Big Bend barometerbush	LEMI4	*Leucophyllum minus*	11-84	–
	rough jointfir	EPAS	*Ephedra aspera*	11-84	–
	javelina bush	COER5	*Condalia ericoides*	11-84	–
	featherplume	DAFO	*Dalea formosa*	6-56	–
	damianita	CHME3	*Chrysactinia mexicana*	6-56	–
	Guadalupe rabbitbrush	CHSP3	*Chrysothamnus spathulatus*	6-56	–
	Arizona honeysuckle	LOAR	*Lonicera arizonica*	6-56	–
	mock orange	PHILA	*Philadelphus*	6-56	–
	catclaw mimosa	MIACB	*Mimosa aculeaticarpa var. biuncifera*	6-56	–
8	**Fibrous/Succulents**			247-471	
	green sotol	DALE2	*Dasylirion leiophyllum*	112-336	–
	Texas sacahuista	NOTE	*Nolina texana*	56-140	–
	Havard's century plant	AGHA	*Agave havardiana*	56-140	–
	banana yucca	YUBA	*Yucca baccata*	56-140	–
	tree cholla	CYIMI	*Cylindropuntia imbricata var. imbricata*	28-112	–
	pricklypear	OPUNT	*Opuntia*	28-112	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	27-45	–
Forb					
9	**Perennial Forbs**			28-112	
	Forb, perennial	2FP	*Forb, perennial*	11-28	–
	bundleflower	DESMA	*Desmanthus*	3-11	–
	buckwheat	ERIOG	*Eriogonum*	3-11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	3-11	–
	needleleaf bluet	HOACP2	*Houstonia acerosa var. polypremoides*	3-11	–
	plains blackfoot	MELE2	*Melampodium leucanthum*	3-11	–

	menodora	MENOD	*Menodora*	3-11	–
	beardtongue	PENST	*Penstemon*	3-11	–
	polygala	POLYG	*Polygala*	3-11	–
	longstalk greenthread	THLO	*Thelesperma longipes*	3-11	–
	noseburn	TRAGI	*Tragia*	3-11	–
10	**Annual Forbs**			0-11	
	Forb, annual	2FA	*Forb, annual*	0-11	–
	woolly plantain	PLPA2	*Plantago patagonica*	0-3	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Inventory data references

Information presented here has been developed from NRCS clipping, composition, plant cover, soils data and ecological interpretations gained by field observation. Several counties in New Mexico were inventoried: Chaves, DeBaca, Guadalupe, Lincoln, San Miguel, Santa Fe, and Torrance.

Other references

References:
1. Hart, C.R., T. Garland, A.C. Barr, B.B. Carpenter, and J.C. Reagor. 2003. Toxic plants of Texas. Texas Cooperative Extension publication, Texas A&M Press, College Station.
2. Ludwig, J.A. and Muldavin, E. 2000. Vegetation change and surface erosion in desert grasslands of Otero Mesa, southern New Mexico: 1982 to 1995. American Midland Naturalist 144:273-285.
3. McNamee, G. 2008. Otero Mesa: preserving America's wildest grassland. University of New Mexico Press, Albuquerque, NM.
4. USDA, Natural Resources Conservation Service, "Plants Database," http://plants.usda.gov/ (accessed August 2009).

Data collection for this site was done in conjunction with the progressive soil surveys within the Pecos-Canadian Plains and Valleys 70 Major Land Resource Area of New Mexico.

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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	09/14/2026
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:**

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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:**
