USDA Natural Resources Conservation Service

Ecological site R070BY067NM
Gyp Hills

Last updated: 9/12/2023
Accessed: 05/21/2025

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.

Ecological site concept

This site occurs on gypsum-derived soils on upland landforms. Soils are gypsiferous in subsurface horizons, and are usually shallower than 20 inches to gypsum bedrock. Slopes range from 10 to 50 percent. Outcrops of gypsum, shale, and sandstone occur along the ridges and on steeper hillslopes.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs shallow and very shallow, well drained, moderately permeable soils that formed in loamy, calcareous, and gypsiferous sediments. Soils are on hills, escarpments, or cliffs and have slopes of 10 to 45 percent. Drainage channels may dissect the site. Mean annual precipitation is about 11 inches and the mean annual temperature is about 62 degrees F. Elevation ranges from 4,200 to 5,000 feet. Exposure varies and is not significant.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Cliff (3) Escarpment
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	4,200–5,000 ft
Slope	10–45%
Ponding depth	0 in
Water table depth	40 in
Aspect	Aspect is not a significant factor

Climatic features

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)	16 in

Influencing water features

No water features are associated with this site.

Soil features

Soils are shallow and very shallow over gypsum. Surface layers are about 4 to 8 inches thick, and have textures of sandy loam, loam, or silt loam. The subsurface is a gypsiferous loam about 8 to 15 inches thick. Underlying material is white or yellowish gypsum to a depth greater than 60 inches. Gypsum content is greater than 40 percent. The available water-holding capacity is low. Permeability is moderate. Gypsum outcrop is common. There are a few areas of deeper soils.

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

Characteristic soils are:
Holloman
Hollomex

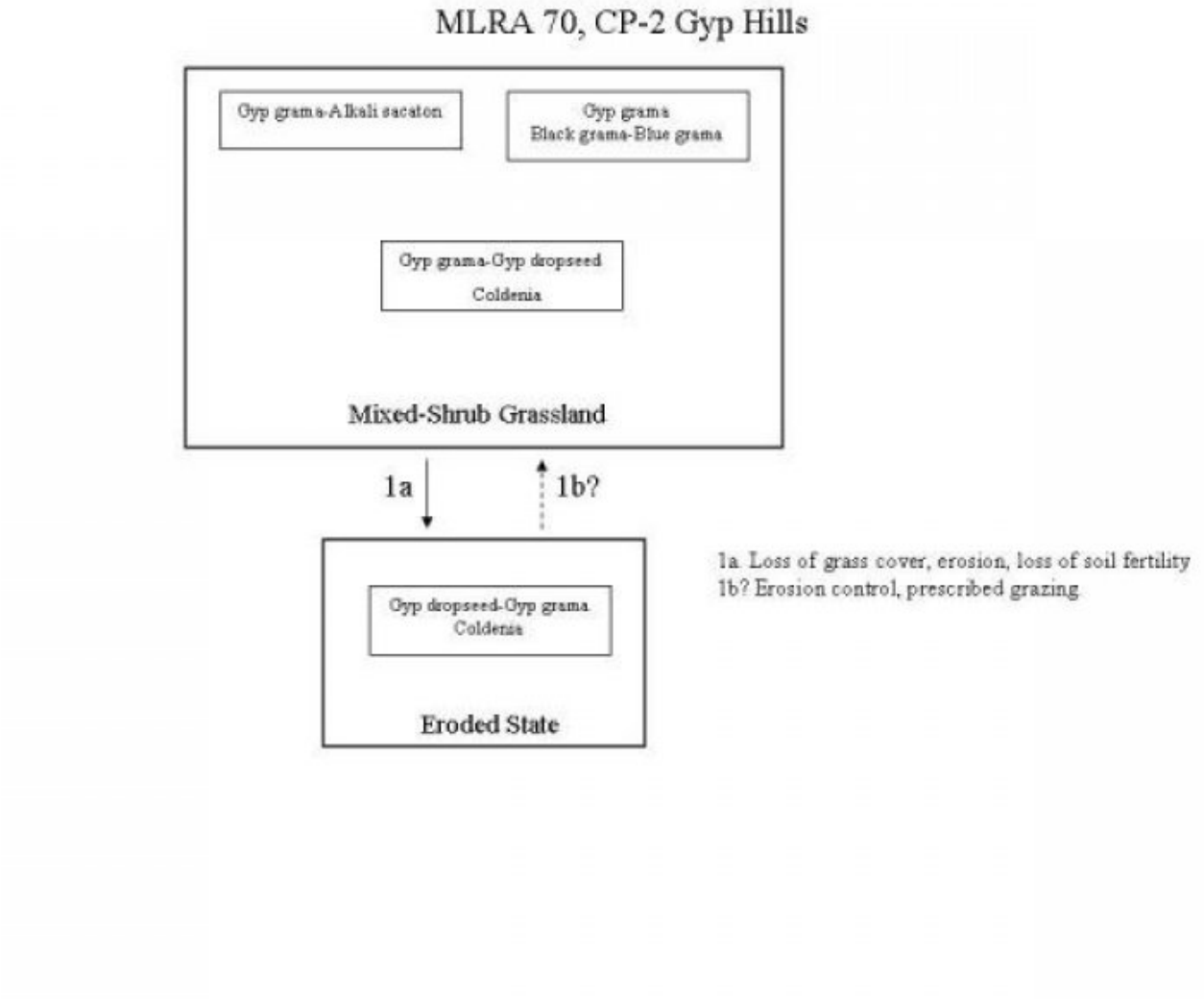
Table 4. Representative soil features

Surface texture	(1) Loam (2) Sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Rapid to very rapid
Soil depth	7–10 in
Surface fragment cover <=3"	0–15%
Available water capacity (0-40in)	2–4 in
Calcium carbonate equivalent (0-40in)	5–20%
Electrical conductivity (0-40in)	2–8 mmhos/cm
Sodium adsorption ratio (0-40in)	2–10
Soil reaction (1:1 water) (0-40in)	7.2–7.8
Subsurface fragment volume <=3" (Depth not specified)	0–15%

Ecological dynamics

This ecological site is dominated by warm-season short- and mid-grasses, with scattered shrubs, forbs, and an occasional juniper. Grasses make up approximately 75 percent of the annual vegetative production. Indicator plants for this site include gyp grama, gyp dropseed, and Coldenia*, which may make up 35 to 40 percent of the plant composition. This site has low resistance to state change. The soils on this site are shallow and highly erosive. Loss of grass cover due to heavy grazing pressure and/or drought can accelerate erosion, decrease soil fertility, and facilitate the transition to the Eroded State.
*Coldenia refers to a genus rather than a common name.

State and transition model



State 1
Mixed-Shrub Grassland

This state contains a mix of shrubs and grasses.

Community 1.1
Mixed-Shrub Grassland

In the reference plant community, gyp grama, alkali sacaton, and gyp dropseed are the dominant grasses. Other grasses that can occur in significant amounts include black grama, blue grama, and tobosa or galleta. Common shrubs/subshrubs include fourwing saltbush, winterfat, and Coldenia*. Community composition is influenced by depth to the gypsic horizon. As the depth to the gypsic horizon decreases; gyp grama, gyp dropseed, and Coldenia increase in representation; and alkali sacaton, blue grama, black grama, galleta, and tobosa decline. Diagnosis: Gyp grama and alkali sacaton; or gyp grama, blue grama, and black grama; are typically dominant on soils that are relatively deeper to the gypsic horizon. On very shallow soils (less than 10 inches to gypsic horizon) gyp grama and gyp dropseed are dominant with increased amounts of Coldenia being present. Large bare areas are present where gypsum occurs at or very near the surface. Rills and small

gullies may be present on steeper slopes. *Coldenia refers to a genus rather than a common name.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	190	340	450
Forb	40	70	90
Shrub/Vine	20	40	60
Total	**250**	**450**	**600**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	7-10%
Grass/grasslike foliar cover	20-25%
Forb foliar cover	5-7%
Non-vascular plants	0%
Biological crusts	0%
Litter	20%
Surface fragments >0.25" and <=3"	5-10%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40%

Figure 5. Plant community growth curve (percent production by month). NM4308, R070BY067NM Gyp Hills Reference State. R070BY067NM Gyp Hills Reference State Mixed warm/cool-season mid/short perennial grassland with a minor woody and forb components. .

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
Eroded State

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

Community 2.1
Eroded

This phase is characterized by accelerated erosion, loss of soil fertility, and decreased productivity. Grass cover is sparse, consisting of small patches of gyp grama and scattered gyp dropseed individuals. Coldenia* is present, especially on shallower soils and on exposed gypsum outcrops. Diagnosis: Grass and litter cover is sparse. Large bare areas are common. Rills and gullies are present and actively eroding. Transition Eroded State (1a): Transitions to the Eroded State occur in response to the loss of grass cover and subsequent erosion. The 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 size and frequency of bare patches. Pedestalling of plants. Increase in size and length of flow patterns and rills. Transition back to Mixed-Shrub Grassland (1b): Erosion control structures would be necessary to help accumulate soil and prevent further nutrient and soil loss. Prescribed grazing will help assure proper forage use and maintain adequate grass and litter cover to help protect the site from erosion. Steep slopes, shallow soils, low available water capacity, and limited precipitation greatly impede such recovery. *Coldenia refers to a genus rather than a common name.

Figure 6. Plant community growth curve (percent production by month). NM4308, R070BY067NM Gyp Hills Reference State. R070BY067NM Gyp Hills Reference State Mixed warm/cool-season mid/short perennial grassland with a minor woody and forb components. .

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 (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**gyp dropseed**			30–70	
	gyp dropseed	SPNE	*Sporobolus nealleyi*	35–70	–
2	**alkali sacaton**			30–50	
	alkali sacaton	SPAI	*Sporobolus airoides*	35–53	–
3	**galleta grass tobosa blue black grama**			20–30	
	blue grama	BOGR2	*Bouteloua gracilis*	18–35	–
	hairy grama	BOHIH	*Bouteloua hirsuta var. hirsuta*	18–35	–
	James' galleta	PLJA	*Pleuraphis jamesii*	18–35	–

	tobosagrass	PLMU3	*Pleuraphis mutica*	18–35	–
4	**sideoats cane bluestem plains bristle nm feathergr**			20–30	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	18–35	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	18–35	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	18–35	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	18–35	–
5	**threeawn sand dropseed**			20–30	
	threeawn	ARIST	*Aristida*	18–35	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	18–35	–
6	**gypsum grama**			30–90	
	gypsum grama	BOBR	*Bouteloua breviseta*	33–90	–
19	**bush muhly ring muhly**			0–10	
	bush muhly	MUPO2	*Muhlenbergia porteri*	3–6	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	3–6	–
Forb					
7	**coldenia**			0–10	
	woody crinklemat	TICAC	*Tiquilia canescens var. canescens*	48–64	–
8	**goldenrod buckwheat**			0–20	
	rayless goldenrod	BIGEL	*Bigelowia*	2–18	–
	buckwheat	ERIOG	*Eriogonum*	2–18	–
10	**misc forb**			0–10	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	4–11	–
Shrub/Vine					
13	**yucca javalina bush sumac**			0–10	
	javelina bush	COER5	*Condalia ericoides*	4–11	–
	skunkbush sumac	RHTRR	*Rhus trilobata var. racemulosa*	4–11	–
	banana yucca	YUBA	*Yucca baccata*	4–11	–
15	**mormon tea**			10–20	
	mormon tea	EPVI	*Ephedra viridis*	11–18	–
16	**winterfat**			10–20	
	winterfat	KRLA2	*Krascheninnikovia lanata*	14–18	–

17	**fourwing**			20	
	fourwing saltbush	ATCA2	*Atriplex canescens*	18–25	–
Tree					
20	**oneseed juniper**			0–10	
	oneseed juniper	JUMO	*Juniperus monosperma*	4–8	–
21	**pinion pine**			0–10	
	twoneedle pinyon	PIED	*Pinus edulis*	4–8	–

Animal community

This ecological site provides habitats which support a resident wildlife community characterized by spotted skunk, black-tailed jackrabbit, desert cottontail, white throated woodrat, common raven, roadrunner, loggerhead shrike, collared lizard, checkered whiptail and western diamondback rattlesnake. There is seasonal use by mule deer and pronghorn antelope.

Hydrological functions

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

Hydrologic Interpretations

Soil Series Hydrologic Group
Hollomex ----------B or D
Holloman ----------B

Recreational uses

The recreational potential on this site is limited due to the fragile soils and plant community. Off-road vehicle use should be discouraged. Hunting for upland game birds is fair while hunting for deer is poor to fair. Rock hunting for gypsum crystals ("Pecos Valley diamonds") is fair to good on areas of gypsum outcrop. The natural beauty is enhanced by the break in physiography of open grasslands.

Wood products

Limited firewood and fence posts are furnished by juniper.

Other products

Grazing: This ecological site can be grazed during any season of the year by all classes of

livestock, but has limited potential as a grazing resource. Generally, younger livestock are better-suited due to steep slopes. The site can be easily damaged by heavy grazing pressure causing loss of cover and a deterioration of the plant community, allowing gyp grama, gyp dropseed, and Coldenia* to completely dominate. Further deterioration generally takes place, which reduces this stand, leading to soil loss and an eventual bare gypsum surface.

Livestock distribution is generally a problem on the steeper slopes of the site, and care must be taken to not overuse any one area. Any grazing management must be designed to maintain adequate plant cover to prevent soil erosion. Due to the shallow soils exposed to heavy grazing pressure, a system of deferred grazing by domestic livestock, which varies the season of grazing and rest during successive years, is needed to maintain the plant community. Approximately 70 percent of the annual yield is from species that furnish forage for livestock. This site provides good nutrition to livestock in winter.

*Coldenia refers to a genus rather than a common name.

Other information

Guidelines for establishing initial stocking rates in acres per animal unit month.

----------Favorable Years----Unfavorable years
Similarity
Index
100 to 76--------6 to 7----------6.9 to 8.1
75 to 51---------6.9 to 8.1--------8 to 12.5
50 to 26---------8 to 12----------12.4 to 28
25 or less-------12.6 plus---------28.1 plus

Type locality

Location 1: De Baca County, NM
Location 2: Guadalupe County, NM
Location 3: Grant County, NM

Contributors

Don Sylvester
John Tunberg

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	05/21/2025
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:**
