USDA Natural Resources Conservation Service

Ecological site R070BY066NM
Gyp Uplands

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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.

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 less than 20 inches to gypsum bedrock. Slopes range from 0 to 50 percent.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Ephedra*
Herbaceous	(1) *Bouteloua breviseta* (2) *Bouteloua eriopoda*

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 basins, valley floors or adjacent terraces and have slopes of 0 to 15 percent. Drainage channels may dissect the site. Mean annual precipitation is about 11 inches and the mean annual temperature is about 62 degrees F. Aspect varies, but is not ecologically significant.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Basin floor (3) Valley floor
Elevation	1,280–1,463 m
Slope	0–15%
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)	406 mm

Influencing water features

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

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. 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:
Holloman
Hollomex

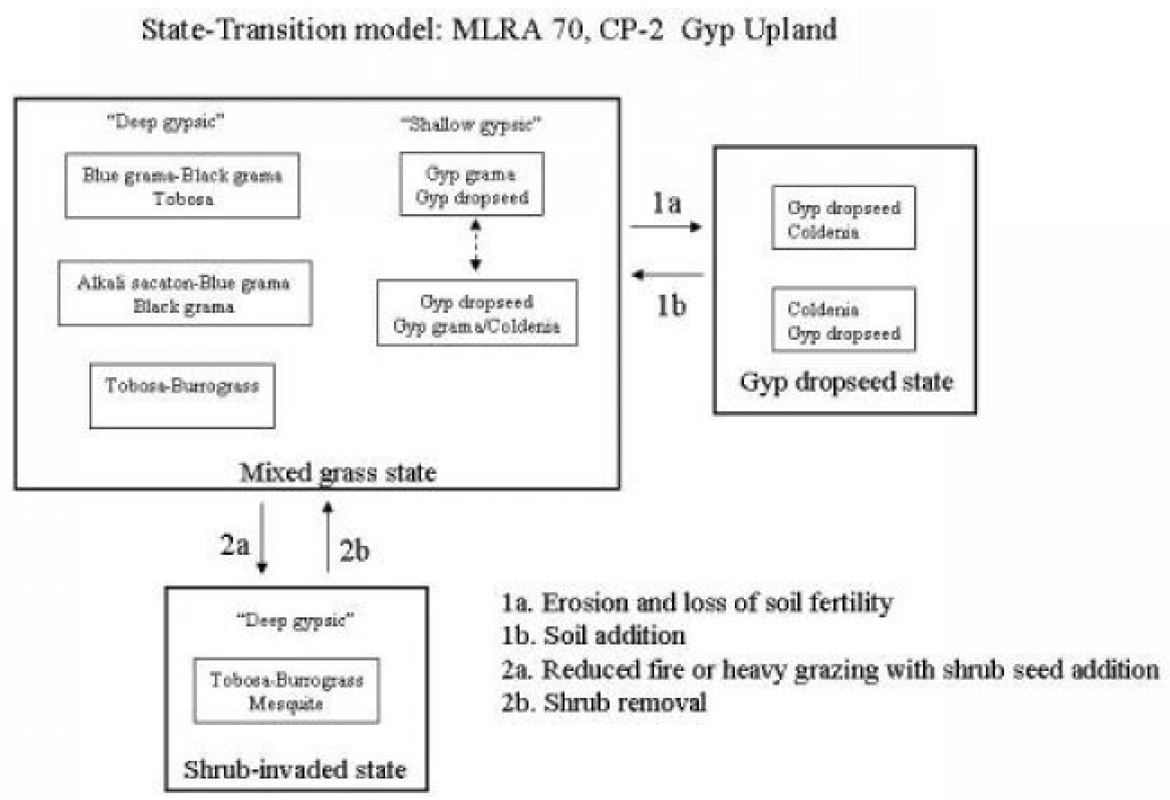
Table 4. Representative soil features

Surface texture	(1) Gypsiferous sandy loam (2) Gypsiferous loam (3) Gypsiferous silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	51–183 cm
Surface fragment cover <=3"	0–5%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	5.08–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	5–15%
Electrical conductivity (0-101.6cm)	2–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	2–10
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.5
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The vegetation of this site often intergrades with that of Loamy ecological sites, depending on the amounts of gypsum, soil texture, and depths of gypsic horizons. Low-lying areas where run-on water occurs behave like draws. Areas where gypsum outcrops are exposed harbor little vegetation. Gyp Uplands may intergrade with the Salt Flats ecological site depending on salinity levels. Thus, the vegetation of this site is very patchy, variable, and difficult to characterize.
Because of the complexity described above, the reference plant community can be subdivided into three components: 1) A blue grama, black grama, tobosa-dominated community associated with soils having relatively deep (greater than 10 inches) gypsic horizons. 2) An alkali sacaton, blue grama, black grama community associated with deep (greater than 10 inches) gypsic horizons and occupying areas that receive extra run-on water, and 3) a gyp grama and gyp dropseed-dominated community on soils with shallow (less than 10 inches) gypsic horizons.
Tobosa and burrograss may also dominate depending on texture, land-use history, or other features. The subshrub Coldenia* increasingly dominates sites with very shallow gypsic horizons as grasses decline. Gyp Uplands soils are susceptible to erosion when vegetative cover is reduced due to drought and overgrazing. Mesquite may invade soils with deeper gypsic horizons that are dominated by tobosa or burrograss. Erosion of A horizons brings gypsic horizons closer to the surface and can shift community composition to dominance by gyp dropseed, Coldenia*, and bare soil.
*Coldenia refers to a genus rather than a common name. As of now, EDIT does not support italics in narratives.

State and transition model



State 1
Mixed Grass State

This state contains a mix of grass species.

Community 1.1
Mixed Grass Community

Blue grama, black grama, and tobosa dominate soils that have gypsic horizons deeper than 10 inches. Saltbush may be an abundant shrub. Alkali sacaton cover increases and may become dominant in run-on settings. On fine-silty or fine-loamy calcareous Gypsid soils, tobosa or burrograss may be dominant. Dominance by burrograss or tobosa might represent grazing-induced retrogression from an alkali sacaton-grama community type on these soils, but this has not been confirmed. Gyp grama and gyp dropseed dominate soils with shallow gypsic horizons and gyp dropseed and Coldenia* tend to dominate where the gypsic horizon is shallowest (less than 3 inches). These communities exhibit low production, perhaps due to the comparatively shallow infiltration in gypsic soil, and to chemical properties. Outcrops of gypsum, often exhibiting a whitish floury mass at the surface, may be devoid of vegetation. Heavy grazing may reduce gramas and increase the dominance of gyp dropseed and Coldenia*, but it is important to recognize that these plants may dominate some patches regardless of grazing pressure. Soil degradation due to surface compaction and reduced infiltration may be important on this site and result in reduced grass cover. Slight variations in the depth to the gypsic horizon, whether human-induced or not, exert a powerful control on plant community composition. Where gypsic horizons are deep, soil texture or soil chemistry may govern composition. Diagnosis: Soils with deeper gypsic horizons should have continuous grass cover with a high representation of blue grama, black grama, alkali sacaton, and tobosa. Shallower soils support gyp grama and black grama. Gypsum outcrops will be dominated by gyp dropseeds or Coldenia*. Depending upon the depths to a gypsic horizon, large (< 1 meter) bare patches may be common, but they should not be common where the depth to gypsic horizon is greater than 5 inches. This site has a grassland aspect with patches of bare or lichen covered soil surface exposed between patches of vegetation. The potential plant community is dominated by grama species, short- and mid-grass perennials, and forbs; with half-shrubs and shrubs sparsely and evenly distributed. *Coldenia refers to a genus rather than a common name.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	336	594	852
Forb	34	67	101
Shrub/Vine	22	34	45
Total	**392**	**695**	**998**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	5-7%
Grass/grasslike foliar cover	20-25%
Forb foliar cover	5-7%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-25%
Surface fragments >0.25" and <=3"	10-12%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	45-50%

Figure 5. Plant community growth curve (percent production by month). NM4066, R070BY066NM Gyp Uplands Reference State. R070BY066NM Gyp Uplands Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	20	25	10	4	4	0

State 2
Gyp Dropseed State

This plant community is characterized by an abundance of gyp dropseed.

Community 2.1
Gyp Dropseed Community

This community is dominated by gyp dropseed or Coldenia*, and often exhibits high amounts of bare ground and exposed gypsum at the surface. Gyp grama, black grama, and alkali sacaton may persist in small patches, especially in low-lying spots receiving run-on water and/or where soils are protected from erosion. The frequency with which these community types represent degradation from mixed grassland due to poor management versus other disturbance regimes is unknown. The conditions under which gyp dropseed and Coldenia* dominate are unknown. Diagnosis: Dominance by gyp dropseed or Coldenia*, high amounts of bare ground, sometimes associated with a high cover of cryptobiotic crusts. Transition to gyp dropseed state (1a): Reduced grass cover caused by heavy grazing pressure and/or drought may result in erosion of surface horizons. As the depth to the gypsic horizon decreases, plant communities will become increasingly dominated by gyp dropseed and/or

Coldenia*. Mechanical disturbance of the soil surface and other forms of soil degradation may contribute to this effect. Key indicators of approach to transition: Increase in size and frequency of bare patches. Pedestalling of plants, extended water flow patterns, and the eventual loss of the A horizon. Transition to mixed grassland (1b): Restoration or recovery of a non-gypsic A horizon would be required. *Coldenia refers to a genus rather than a common name.

Figure 6. Plant community growth curve (percent production by month). NM4066, R070BY066NM Gyp Uplands Reference State. R070BY066NM Gyp Uplands Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	20	25	10	4	4	0

State 3
Shrub-Invaded state

This state contains abundant shrubs.

Community 3.1
Shrub-Invaded Community

On deep gypsic soils and soils with less strong gypsic horizons (i.e. a lower percentage of gypsum) within this site, mesquite may invade and cause some reduction in grass cover due to competition with grasses. These communities are dominated by tobosa or burrograss. Saltbush may also be an important component. It is not known if shrub presence and resulting erosion may result in the loss of dominant perennial grasses across broad areas on gypsic soils. As soil characteristics grade toward those of the Loamy ecological site, widespread grass loss may be increasingly probable. Diagnosis: Moderate densities of mesquite and bare ground associated with mesquite patches. Transition to shrub-invaded state (2a): Reduced grass cover in soils with relatively deep gypsic horizons may result in mesquite invasion. Key indicators of approach to transition: Increasing bare ground. Presence of mesquite seedlings. Transition to mixed grassland (2b): Shrub removal may result in the eventually recovery of perennial grasses.

Figure 7. Plant community growth curve (percent production by month). NM4066, R070BY066NM Gyp Uplands Reference State. R070BY066NM Gyp Uplands Reference State.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	20	25	10	4	4	0

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	**gyp grama black grama**			90–101	
	gypsum grama	BOBR	*Bouteloua breviseta*	91–105	–
	black grama	BOER4	*Bouteloua eriopoda*	91–105	–
2	**blue grama gyp dropseed**			67–101	
	blue grama	BOGR2	*Bouteloua gracilis*	71–99	–
	gyp dropseed	SPNE	*Sporobolus nealleyi*	71–99	–
3	**tobosa grass**			56–67	
	tobosagrass	PLMU3	*Pleuraphis mutica*	56–71	–
4	**alkali sacaton**			34–45	
	alkali sacaton	SPAI	*Sporobolus airoides*	35–49	–
5				22–34	

	cane bluestem	BOBA3	*Bothriochloa barbinodis*	21–35	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	21–35	–
6				22–34	
	threeawn	ARIST	*Aristida*	21–35	–
7				11	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	7–15	–
	bush muhly	MUPO2	*Muhlenbergia porteri*	7–15	–
	plains bristlegrass	SEVU2	*Setaria vulpiseta*	7–15	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	7–15	–
Forb					
8				22–45	
	crinklemat	TIQUI	*Tiquilia*	28–43	–
9				0–22	
	buckwheat	ERIOG	*Eriogonum*	0–21	–
	southern goldenbush	ISPL	*Isocoma pluriflora*	0–21	–
10				0–11	
	locoweed	OXYTR	*Oxytropis*	0–7	–
11				11–22	
	Forb, perennial	2FP	*Forb, perennial*	7–21	–
12				11–22	
	Forb, annual	2FA	*Forb, annual*	15–28	–
Shrub/Vine					
13				11–22	
	fourwing saltbush	ATCA2	*Atriplex canescens*	7–21	–
	jointfir	EPHED	*Ephedra*	7–21	–
14				11–22	
	javelina bush	COER5	*Condalia ericoides*	7–21	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	7–21	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	7–21	–
	pricklypear	OPUNT	*Opuntia*	7–21	–
	yucca	YUCCA	*Yucca*	7–21	–

Animal community

This site provides habitat which supports a resident animal community characterized by spotted skunk, black-tailed jackrabbit, desert cottontail, white-throated woodrat, common raven, roadrunner, loggerhead shrike, collard 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

Wood products

This site produces no wood products.

Other products

Grazing:
This site can be grazed at any season of the year by all classes of livestock, generally without regard to age. However, it has limited potential as a grazing resource. This site can be easily damaged by heavy grazing pressure causing a loss in cover and deterioration of the plant community to gyp grama, gyp dropseed and Coldenia to become completely dominant. Further deterioration results in soil loss, eventually leading to a bare gypsum surface. Grazing management should be designed to maintain adequate plant cover to prevent soil erosion. Due to the sites low potential to produce forage, this site should not be 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 during the winter, but care must be taken not to overgraze during this period.

Contributors

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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	05/07/2024
Approved by	Kendra Moseley
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:**

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:**