

Ecological site R042BB010NM

Gravelly, Desert Shrub

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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.

Associated sites

R042BB012NM	Sandy, Desert Shrub
R042BB014NM	Loamy, Desert Shrub On bajadas, Gravelly sites often grade into Loamy and Gravelly Loam sites.
R042BB024NM	Gravelly Sand, Desert Shrub
R042BB035NM	Gravelly Loam, Desert Shrub This site often exists with inclusions of Gravelly Loam, Gravelly Sand, or Sandy ecological sites.

Similar sites

R042BB035NM	Gravelly Loam, Desert Shrub This site can have similar species composition, but typically lower production than Gravelly Loam sites. Gravelly sites can occur on the same landform and landscape positions as Gravelly Loam sites.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs as a complex of soils. : alluvial fan, fan piedmonts, fan remnant, some low hills or ridge slopes. The soils formed in calcareous gravelly alluvium from limestone and sandstone. Slopes average less than 5 percent but range as high as 30 percent. Aspect is variable. Elevations range from 3,800 to 5,200 feet.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Fan piedmont (3) Fan remnant
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Very rare to rare
Ponding frequency	None
Elevation	1,160 – 1,590 m
Slope	10 – 30 %
Ponding depth	0 cm
Water table depth	190 cm
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)	210 days
Freeze-free period (average)	230 days
Precipitation total (average)	310 mm

Influencing water features

This site is not influenced by water from wetland or stream.

Soil features

Soils are mainly shallow soils, few of them are deep. Surface textures are calcareous gravelly, very gravelly loams, Gravelly, very gravelly sandy loams, extremely gravelly loams, very gravelly silty clay loam or gravelly sandy clay loam. The underlying layers are to either an indurated caliche layer or limestone within 20 inches. The underlying material of the deep soils are strongly calcareous, calcium carbonate disseminated and segregated as common soft bodies. Slopes average less than 5 percent but range as high as 30 percent.

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

Characteristic soils:

Conger
Tres Hermanos
Nickel (soon to be updated)
Delnorte
Tencee
Upton
Brenda

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly loam (3) Very gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to moderately well drained
Permeability class	Moderately slow to moderate
Soil depth	50 – 150 cm
Surface fragment cover <=3"	20 – 50 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	6.35 – 17.27 cm
Calcium carbonate equivalent (0-101.6cm)	20 – 50 %

Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	20 – 60 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

Overview:

This ecological site may exist with inclusions of gravelly sand, gravelly loam, or sandy ecological sites. On bajadas, it often grades into gravelly loam and loamy ecological sites. The presence of a shallow petrocalcic layer in this site limits productivity and is an important aspect of its ecology. As currently defined, the gravelly site exhibits a high degree of topographic diversity. The historic plant community type is generally assumed to exhibit co-dominance between grasses, including black grama (*Bouteloua eriopoda*) and bush muhly (*Muhlenbergia porteri*), and shrubs and half-shrubs, chiefly creosotebush (*Larrea tridentata*) and mariola (*Parthenium incanum*). Due to variation in aspect, slope, landscape position, and subsurface soil properties, there is likely to have been considerable variation in historic plant communities within and among gravelly soil series. In cases where natural erosional slopes occur along bajadas (e.g. the erosional fan remnant of the fan piedmont landform; Wondzell et al. 1996), creosotebush may have dominated plant communities since pre-colonization times (Stein and Ludwig 1979). In the upper fan collar near the base of desert mountains, on the other hand, runoff water to loamy-skeletal soils may currently support black-grama dominated communities with few shrubs.

Transitions from mixed shrub grasslands to a mixed shrub-dominated state may be catalyzed by overgrazing (Whitford et al. 2001) which reduces grass competition to shrubs. Drought and or fire suppression may also be important factors although this has not been demonstrated. In these cases, creosotebush and tarbush (*Flourensia cernua*) may be climax species that, without disturbance, come to dominate on certain soils (Muller 1940, McAuliffe 1994). Transitions to the shrubland state are associated with severe and persistent grass cover reduction, erosion, and soil truncation (Gile et al. 1998). Buffington and Herbel (1965) documented waves of invasion and replacement among tarbush, honey mesquite (*Prosopis glandulosa*), and creosotebush whose sequence differed on different gravelly soil series. Furthermore, there have been recent increases in whitethorn acacia (*Acacia constricta*) with declines in creosotebush on some gravelly soils (Bestelmeyer, in preparation). The causes of creosotebush encroachment throughout the southwest are potentially numerous. Together, the various studies of this shrub's biology highlight the complexities involved in modeling and managing grassland conversion.

Despite these studies, little quantitative information exists concerning the causes of transitions among states in SD-2. No systematic studies exist regarding the effects of range management on grassland-shrubland transitions in the gravelly ecological site group. McAuliffe's (1994) studies of creosotebush distribution in the Sonoran desert provide an interesting basis for comparative work in the Chihuahuan desert. Such broad-scale comparisons will provide important clues to the factors regulating creosotebush encroachment in SD-2.

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	Warm Season			50-67	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	50-67	–
	bush muhly	MUPO2	<i>Muhlenbergia porteri</i>	50-67	–
2	Warm Season			17-34	
	cane bluestem	BOBA3	<i>Bothriochloa barbinodis</i>	17-34	–
	Arizona cottontop	DICA8	<i>Digitaria californica</i>	17-34	–
	plains bristlegrass	SEVU2	<i>Setaria vulpiseta</i>	17-34	–
3	Warm Season			3-6	
	threeawn	ARIST	<i>Aristida</i>	3-6	–
4	Warm Season			0-3	
	burrograss	SCBR2	<i>Scleropogon brevifolius</i>	0-3	–
5	Warm Season			3-17	
	feather pappusgrass	ENNEA	<i>Enneapogon</i>	3-17	–
	slim tridens	TRMUE	<i>Tridens muticus</i> var. <i>elongatus</i>	3-17	–
6	Warm Season			3-17	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	3-17	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	3-17	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	3-17	–
Shrub/Vine					
7	Shrub			50-67	
	creosote bush	LATR2	<i>Larrea tridentata</i>	50-67	–
8	Shrub			10-17	
	mariola	PAIN2	<i>Parthenium incanum</i>	10-17	–
9	Shrub			3-10	
	yerba de pasmo	BAPT	<i>Baccharis pteronioides</i>	3-10	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	3-10	–
10	Shrub			3-17	
	American tarwort	FLCE	<i>Flourensia cernua</i>	3-17	–
	crown of thorns	KOSP	<i>Koeberlinia spinosa</i>	3-17	–
	littleleaf sumac	RHMI3	<i>Rhus microphylla</i>	3-17	–
11	Shrub			3-7	
	whitethorn acacia	ACCO2	<i>Acacia constricta</i>	3-7	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	3-7	–
12	Shrub			3-7	
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	3-7	–
13	Shrub			3-17	
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	3-17	–
Forb					
14	Forb			17-34	
	dwarf desertpeony	ACNA2	<i>Acourtia nana</i>	17-34	–

	croton	CROTO	<i>Croton</i>	17-34	–
	buckwheat	ERIOG	<i>Eriogonum</i>	17-34	–
	woolly paperflower	PSTA	<i>Psilostrophe tagetina</i>	17-34	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	17-34	–
15	Annual Forbs			3-17	
	Forb, annual	2FA	<i>Forb, annual</i>	3-17	–
16	Perennial Forbs			3-17	
	Forb, perennial	2FP	<i>Forb, perennial</i>	3-17	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

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

This range site provides habitats which support a resident animal community that is characterized by desert muledeer, coyote, desert cottontail, Merriam's kangaroo rat, white throated woodrat, cactus mouse, golden eagle, scaled quail, crissal thrasher, black-throated sparrow, collared lizard, round-tailed horned lizard, striped whipshake and Couch's spadefoot toad. Woody vegetation of associated desert washes concentrate wildlife and provide breeding areas for mourning dove, Swainson's hawk and roadrunner.

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 Upton-----C Delnorte-----C Nickel-----B(soil soon to be updated) Conger-----D Tres Hermanos ----B Tencee -----D Brenda-----C

Recreational uses

Recreation potential is limited largely by the hot summers and windy spring weather of the Lower Sonoran Life Zone, Within which the site is located. Suitability for camping and picnicking is fair, the site is generally suitable for rock hounding, and hunting is limited primarily to quail, dove, and small game. Photography and bird watching can be worthwhile, especially during migration seasons. Most small animals 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 shrubs, forbs, and cacti occurs.

Wood products

This site has no significant value for wood products.

Other products

This site is suitable for grazing in all seasons of the year, although most of the green forage is produced during the months of July, August, and September. The site is adapted for use by all classes of livestock. It is not, however, a highly productive site, and good management is essential to either maintain or to improve condition. Retrogression is characterized by an almost total take – over by woody plants, chiefly creosotebush, and by low – value grasses such as fluffgrass. Recovery is extremely slow and woody plant control may be needed to effect a reasonable rate of recovery.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index-----Ac/AUM 100 - 76-----7.3 – 8.5 75 – 51-----8.3 – 10.0 50 – 26-----9.5 – 26.0 25 – 0-----26.0 - +

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:

Upton gravelly loam

Nickel gravelly loam, gravelly sandy loam, very gravelly loam, or very gravelly sandy loam

Cave gravelly sandy loam

Tencee very gravelly loam

Delnorte very gravelly loam

Other Soils included are:

Tres Hermanos gravelly loam

Conger gravelly loam, fine sandy loam

Terino very gravelly sandy loam

Tres hermanos gravelly sandy clay loam

Casito very gravelly sandy loam

Tres hermanos sandy loam

Chamberino gravelly loam

Upton clay loam (mapped in a complex in Grant County)

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:
