# Ecological site R042BB010NM
# Gravelly, Desert Shrub

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.

## Associated sites

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

## Similar sites

| | |
|---|---|
| R042BB035NM | **Gravelly Loam, Desert Shrub**<br>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. |

**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 frome 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<br>(2) Fan piedmont<br>(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 | 3,800–5,200 ft |
| Slope | 5–30% |
| Ponding depth | 0 in |
| Water table depth | 76 in |
| 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) | 205 days |
| Freeze-free period (average) | 227 days |
| Precipitation total (average) | 12 in |

## 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, extreamly 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<br>(2) Very gravelly loam<br>(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 | 19–60 in |
| Surface fragment cover <=3" | 15–45% |

| | |
|---|---|
| Surface fragment cover >3" | 0–10% |
| Available water capacity (0-40in) | 2.5–6.8 in |
| Calcium carbonate equivalent (0-40in) | 15–50% |
| Electrical conductivity (0-40in) | 0–2 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 0 |
| Soil reaction (1:1 water) (0-40in) | 7.4–8.4 |
| Subsurface fragment volume <=3" (Depth not specified) | 15–60% |
| Subsurface fragment volume >3" (Depth not specified) | 0–10% |

## Ecological dynamics

Overview:

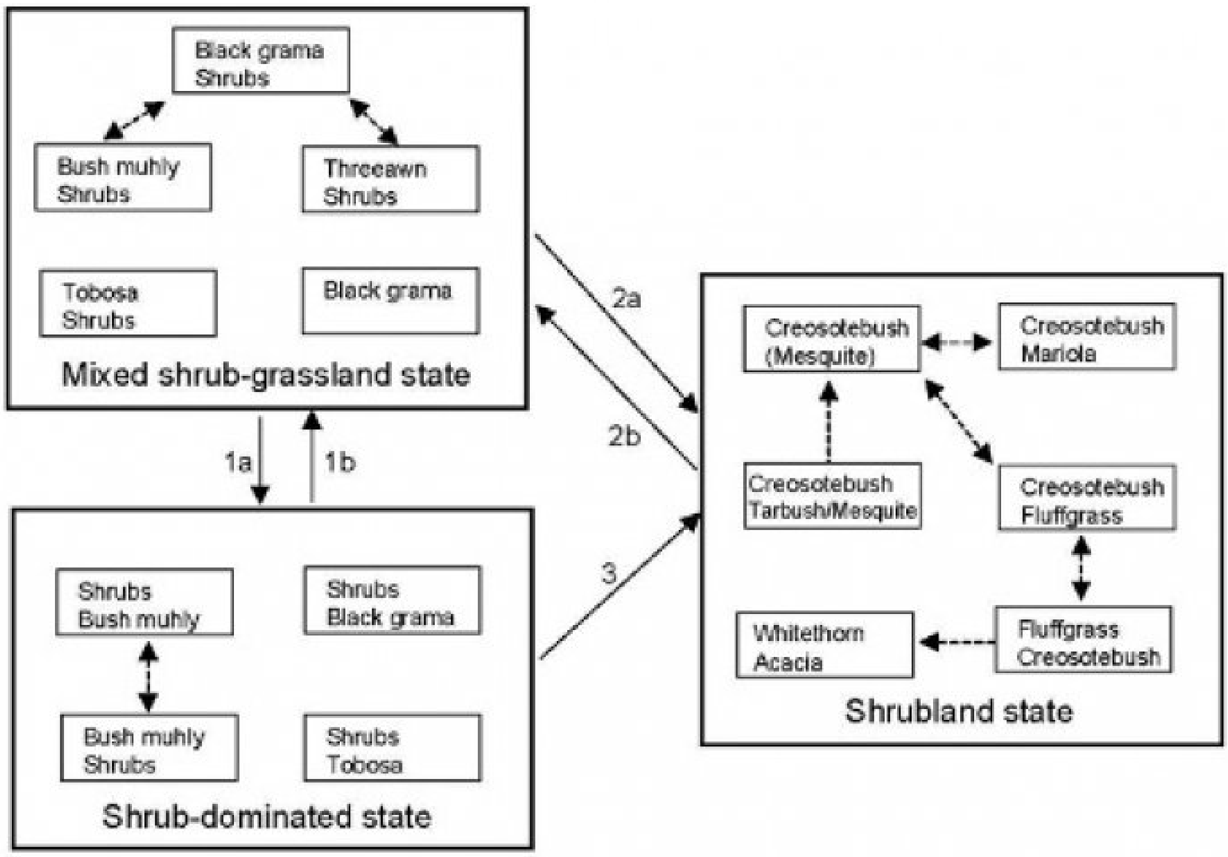
This ecological site may exist with inclusions of gravelly sand, gravelly loam, or sandy ecological sites. On bajadas, it often grades into gravelly loam and loamy ecological sites. The presence of a shallow petrocalcic layer in this site limits productivity and is an important aspect of its ecology. 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, runon 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

State-Transition model: MLRA 42, SD-2, Gravelly subgroup: Gravelly




1a. Overgrazing, summer drought, or lack of fire; 1b. Shrub control
2a. Severe overgrazing, widespread grass mortality, with erosion and soil truncation
2b. Shrub control with soil addition or modification and stabilization
3. Persistent reduction in grasses, competition by shrubs, erosion and soil truncation

**State 1**
**Historic Climax Plant Community**

**Community 1.1**
**Historic Climax Plant Community**


**Figure 4. MLRA 42; SD-2; Gravelly**

State Containing Historic Climax Plant Community Mixed-shrub grassland: The historic plant community is believed to have been dominated by grasses, especially bush muhly and black grama, and sometimes dropseeds (Sporobolus spp.). Shrubs, especially creosotebush, are codominants(black grama/shrubs community). Production is generally low (up to 450 lbs/acre) compared to other ecological sites. The biomass of bush muhly and black grama may be equal to that of creosotebush. Few such communities occur in gravelly ecological sites today. Grazing-induced retrogression from this community is characterized by a reduction in the cover of black grama, and may result in an increase in the proportional representation of bush muhly (bush muhly/shrub community). This is paralleled by an increase in bare ground and the cover of fluffgrass (*Dasyochloa pulchella*). In other cases, bush muhly may either decline alongside black grama or have been a minor component, and threeawns (Aristida spp) may increase (threeawn/shrub community). It is possible that shifts in the dominance of black grama and bush muhly occur in response to climatic variation as well, but this is not known. Additional communities may be observed that differ from the historic climax plant community described in the 1979 range site description due to landscape position or variations in soil texture. Where gravelly sites (as currently defined) occur in the upper portions of fan collars at the bases of desert mountains (i.e. Mt. Summerford, College Ranch, Doña Ana Co.; Wondzell et al. 1996), run-on water and low erosion rates appear to create conditions that are favorable to black grama grassland maintenance and few shrubs occur (black grama community). Further away from the mountain front on the lower fan collar, erosion is greater and the black grama/shrubs community is supported. In areas of gravelly hills or "breaks" along the sides of the Rio Grande Valley, arroyos draining into the valley separate ridges of Gravelly soils (known as ballenas). Soil properties and vegetation vary with position across the ridge and with changing aspect. At one site in Sierra County (Gene Adkins NRCS, Brandon Bestelmeyer, USDA-ARS, and George Chavez, NRCS, personal observations), some ridge tops had less clay and more calcium carbonate than on side slopes. Ridge tops were dominated by creosotebush with a sparse cover of fluffgrass and no other grasses. North-facing slopes supported a mixture of black grama and sideoats grama (*Bouteloua curtipendula*) as dominants. South-facing slopes often supported large patches of tobosa (*Pleuraphis mutica*). At a similar site in Socorro County, soil properties did not vary with aspect but vegetation did (see photos). Ridge tops were dominated by creosotebush whereas north-facing slopes were dominated by black grama; south-facing slopes were intermediate. Furthermore, black grama appears to be far less common on gravelly slopes south of Rincon (even on the same soil map unit—Nickel gravelly sandy loam). Thus, the composition of historic plant communities and their resilience to grazing perturbation is highly variable at both small (100 m) and large (100 km) scales, even within restricted areas of SD-2. It may prove useful to split out the gravelly breaks areas from the more level areas as a distinct ecological site. Diagnosis: Cover of black grama and/or bush muhly and other grasses more or less continuous and occurs in shrub interspaces. Shrub density variable, but typical intershrub distance should be several meters to 10s of meters. Depending upon slope and landscape position, rills, gullies, and arroyos may be common. Additional States and Transition Pathways: Transition to shrub-dominated state (1a): Overgrazing is believed to initiate this transition. Gardner (1951) noted that bush muhly was found outside of shrub canopies only in ungrazed sites, indicating that the loss of grasses in interspaces may be caused by grazing. Subsequent competition or loss of intershrub soil fertility, perhaps exacerbated by the allelopathic effects of expanding creosotebush clones, may preclude reestablishment by grasses. Prolonged domination by shrubs may eventually lead to a transition to a shrubland state within which shrub control measures do not result in increased grass cover (transition 3, see below). It is possible that a high cover of stones or gravel may retard erosional soil losses and prolong the window in which grasses may be recovered. Alternatively, climatic changes and/or reduced fire disturbance may drive this transition on certain landscape positions (i.e. where run-on water is not a factor). Generally, the presence or absence of run-on water will cause large variation in the sensitivity of a gravelly site to grazing. A systematic documentation of these relationships would be an important contribution to our understanding of this site. Key indicators of approach to transition: Decreases in grass and litter cover, increases in bare patch size, increases in the frequency and size of rills, gullies, and litter movement Transition to shrubland state (2a): Severe overgrazing causing grass loss with subsequent erosion, gullying, and soil truncation may cause a transition to a shrubland state from which grass does not recover for decades. Severe overgrazing in drought conditions, perhaps followed by heavy summer rains and excessive erosion, may lead a system to bypass the Shrub-dominated state altogether and extinguish most large perennial grasses. In this case, soil loss is often apparent, especially notable in the pedestalling of shrubs. Key indicators of approach to transition: Decreases, sometimes rapid, in grass and litter cover, increases in bare patch size, increases in the frequency and size of rills, gullies, and litter movement, accumulation of gravel and pebbles at the surface, pedestalling.

**Table 5. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---:|---:|---:|
| Grass/Grasslike | 89 | 177 | 266 |
| Shrub/Vine | 49 | 99 | 148 |
| Forb | 12 | 24 | 36 |
| **Total** | **150** | **300** | **450** |

**Table 6. Soil surface cover**

| | |
|---|---|
| Tree basal cover | 0% |
| Shrub/vine/liana basal cover | 0% |
| Grass/grasslike basal cover | 12% |
| Forb basal cover | 0% |
| Non-vascular plants | 0% |
| Biological crusts | 0% |
| Litter | 1-5% |
| Surface fragments >0.25" and <=3" | 15-45% |
| Surface fragments >3" | 0-5% |
| Bedrock | 0% |
| Water | 0% |
| Bare ground | 35-50% |

**Figure 6. Plant community growth curve (percent production by month). NM2502, R042XB010NM-HCPC Gravelly Warm Season Plant -HCPC. SD-2 Gravelly Warm Season Plant Community.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 5 | 8 | 10 | 12 | 30 | 20 | 10 | 5 | 0 | 0 |

## State 2

## Shrub-Dominated

## Community 2.1
## Shrub-Dominated

Additional States and Transition Pathways: Shrub-dominated state: This state is characterized by a predominance of shrubs (mostly creosotebush and tarbush) with large perennial grasses existing as a subordinate or minor component. Often, shrubs exist as discrete patches with little grass intermixed with areas in which grass is more common and shrub densities are lower. A sparse cover of fluffgrass may occupy the mostly open areas. Localized soil truncation or loss of soil fertility may occur, especially along the sides or arroyos and gullies. In some cases, the erosional-depositional banded vegetation process (e.g. Montana et al. 1990, see Clayey model) occurs on slight (< 1%) slopes where gullying is not apparent. Typically, bush muhly is the dominant grass (Shrubs/bush muhly community), although in some “gravelly hills” situations, black grama persists at low densities (Shrubs/black grama community). This latter situation is often observed on south-facing slopes that are presumably more droughty. On sites with heavier subsurface soils, tobosa may constitute the grass component (Shrubs/tobosa community). Bush muhly is often associated with the bases of shrubs, and may be almost entirely restricted to shrub bases. Nonetheless, this grass constitutes a high percentage of ground cover. Bush muhly establishment appears to be favored under creosotebush, likely due to the interception of wind-born inflorescences and the concentration of nutrients under shrubs (Whitford et al. 1997). Under these conditions, bush muhly may compete with creosotebush and cause creosotebush decadence once the bush muhly volume occupies more than 50% of the aboveground shrub volume (Welsh and Beck 1976). This interaction, in conjunction with the use of effective herbicides such as Tebuthiron, can increase the abundance of bush muhly within this state (Bush muhly/shrubs community). Threeawns may also increase following this treatment. If localized losses of soil fertility or climatic shifts are associated with the transition, however, the conditions promoting shrub establishment at the expense of grasses may persist. Thus, this community would still occupy the shrub-dominated state because intermittent removal of shrubs would be required to maintain grasses within the system. Diagnosis: Cover of black grama and/or bush muhly patchy. Bare expanses of several to 10s of meters are typical. Bush muhly and other grasses may be restricted to the bases of shrubs. Shrub density is moderate, typical intershrub distances may be 2–3 m. Rills, gullies, and arroyos may be common. Evidence of sheet flow in large bare areas present. Pedestalling is apparent. Transition to shrubland state (3): See transition 2a above. Persistent lack of grasses may lead to erosion and soil truncation, and grasses may take decades or more to recover. Transition to mixed-shrub grassland state (1b): Restoration of self-maintaining grass cover may be accomplished through repeated shrub control events. Where seed limitation is a factor, seeding and furrowing may be used to restore grasses, but Gibbens et al. (1993) found this to be unsuccessful on Tencee soils. The use of gully seeders to release seeds when rains flush washes to seed target areas downslope may have promise (Barrow and Havstad, ms). Contour terraces, on the other hand, have not been successful, although they were not maintained (Rango et al. in press). Protection of sites from native herbivores such as jackrabbits may facilitate natural reestablishment of grasses (Havstad et al. 1998).

## State 3
## Shrubland

### Community 3.1
### Shrubland

Creosotebush state: In this state, perennial grasses of large stature, including black grama and bush muhly, are largely or entirely absent, with a few individual bush muhly persisting under some shrubs. Typically, creosotebush is the overwhelming dominant. Soil truncation is apparent at this stage and the petrocalcic or calcic horizon may be exposed at the surface. Sheetflow erosion with loss of finer particles may concentrate gravel at the surface to produce a barren desert pavement in shrub interspaces. In some cases, creosotebush is the sole perennial plant. On gravelly soils, Buffington and Herbel (1965) documented the eventual loss of tarbush from the shrub mix to dominance by either pure creosotebush or creosotebush with some mesquite. It is unclear in this study what changes to grass cover accompanied these changes in shrub dominance. Grass reestablishment within this state is virtually impossible. Note that it can be difficult to ascertain when sufficient soil erosion has occurred to preclude rapid grass reestablishment. Sites "written off" prematurely may lead to continued erosion and the option of recovering grasses may be lost. In other cases, shrubs and subshrubs such as mariola and/or zinnia (*Zinnia acerosa*) and Dyssodia acerosa may be subdominants (Creosotebush/mariola) and may fluctuate in abundance due to climate. Fluffgrass cover may be significant (Creosotebush/fluffgrass community), and where creosotebush has been controlled using herbicides, or where creosotebush cover is limited by shallow soils due to truncation, fluffgrass may be dominant (Fluffgrass/creosotebush community). Whitethorn acacia (*Acacia constricta*) has invaded and/or expanded within creosotebush shrublands in Las Cruces area over the last 40 years, and might constitute a distinct state. McAuliffe (1994) and Hamerlynck et al. (2000) have suggested that the limited deep soil water recharge on soils with shallow argillic horizons may limit creosotebush growth. Petrocalcic horizons may similarly retard soil water penetration to deep roots (Gile et al. draft ms). Where roots penetrate the petrocalcic, however, water may be funneled to roots (Gile et al. 1998). If soil truncation prohibits grass establishment above the petrocalcic, but creosotebush can exploit water through pipes and cracks over a large area (Gibbens and Lenz 2001), this may explain the success of creosotebush in comparison to grasses on truncated soils. This mechanism may also explain the contrasting roles of restrictive layers between studies in the Sonoran and Chihuahuan deserts if pipes are not present in the argillic layer of McAuliffe's (1994) study. Diagnosis: Black grama and/or bush muhly typically absent, although bush muhly may occur the bases of a few shrubs. Shrub density may be high with shrub crowns touching. Rills, gullies, and arroyos may be common. Evidence of sheet flow in large bare areas is present. Pedestalling is common, and soil deflation often produces a desert pavement of packed gravel and small stones. Transition to mixed-shrub grassland state (2b): Destruction of gullies and the use of water spreaders may be beneficial. Pitting or other erosion stabilization techniques would probably be needed for the accumulation of organic matter. Seeding would be required. Where physical soil crust/pavement has developed, soil disturbance may promote infiltration. If shallow petrocalcic horizons are exposed, grass recovery would not be possible until soil is added or the horizon was destroyed. Data and information sources and theoretical background: Communities and states are derived largely from information obtained using broad-scale associations recorded by Buffington and Herbel (1965) and Gardner (1951) and by field observations of Brandon Bestelmeyer, USDA-ARS Jornada Experimental Range, Gene Adkins, NRCS Truth or Consequences, Jim Powell, NRCS, retired. Studies by Buffington and Herbel (1965) and Whitford et al. (2001) directly address transitions on gravelly soils in SD-2, and Herbel et al. (1973) and Jerry Barrow and Kris Havstad (unpublished ms) discuss restoration strategies. Three hypotheses for transitions between mixed shrub grassland and shrub-dominated and shrubland states can be identified. Patterns observed by McAuliffe (1994), Gibbens and Lenz (in review) and discussed by Gile et al. (draft ms) support the soil truncation hypothesis. This holds that erosion due to disturbance-induced loss of plant cover, or due to natural, long-term processes, removes soil surface horizons, bringing the calcic or petrocalcic horizon (a characteristic of gravelly site soils) closer to the surface. Because carbonate is relatively impermeable, this may cause runoff to increase and infiltration to decrease. This, in turn, inhibits the establishment of grass, as well as shrubs, and may stress existing shrubs. Despite this stress, shrubs may come to dominate under these conditions by exploiting deeper soil layers through gaps in petrocalcic layers and reproducing via clonal growth. Water may also be funneled and concentrated through gaps (similar to the effect of krotovinas created by burrowing animals; Gile et al. 1997). Increases in creosotebush via clonal growth may require long periods of time without disturbance (McAuliffe 1994). The scenario outlined by Whitford et al. (2001) can be referred to as the allelopathy hypothesis. This explanation proposes that grazing and/or drought creates gaps in the cover of black grama that permit increasing dominance by creosotebush. As creosotebush develops free from competition with grass, it increasingly releases allelopathic chemicals from litter fall that is detrimental to the soil fauna and flora. This, in turn, increases decreases infiltration and nutrient availability, increases erosion, and inhibits grass germination. Alternatively, creosotebush may be a more effective competitor for surface soil water than grasses (the competition hypothesis). Thus, the allelopathy and competition hypotheses can be complementary to the soil truncation hypothesis. Allelopathic/competitive effects of creosotebush may contribute to soil truncation. In both cases, the nutrient concentration hypothesis (Schlesinger et al. 1990; see Sandy model) explains the persistence of shrubs under these conditions. If the mechanism of Whitford et al. operates, then the expansion of creosotebush is the key process responsible for the transition from mixed shrub grassland to a shrub-dominated state. Allelopathic effects may lead to the eventual replacement grasses over time without shrub control. Remediation under this scenario may be difficult, especially if the allelochemicals have persistent effects. On the other hand, if the allelopathy hypothesis is false, then there may be stable coexistence of creosotebush and grasses and grazing management may prevent further degradation even after shrubs have begun to encroach into previously shrub-free settings. In some areas at least, creosotebush has coexisted with grasses for long periods, so some unrecognized factors may limit creosotebush establishment and dominance (perhaps soil instability; McAuliffe 1994). Alternatively, the allelopathy mechanism may not operate in many, or any, situations. The climate change hypothesis may also explain the expansion shrubs into areas of grassland (Neilson 1986; see the Sandy model) and the decline of grasses, especially black grama. The persistence of black grama on certain landscape positions (see below), however, indicates that climate alone is not responsible for the loss of black grama. Reynolds et al. (1999) found that creosotebush is very flexible in the seasonal use of moisture and can adapt its periods of physiological activity to match periods of soil moisture availability. Thus, areas dominated by black grama receiving run-on water may be buffered from the effects of climate change that are important in other landscape positions (e.g. plains). In run-in positions, black grama can continue to successfully impede creosotebush establishment, whereas in other settings, creosotebush has experienced competitive release under the current climate and can capitalize on its physiological flexibility. A reduction in fire frequency may also be associated with grass reduction and shrub expansion, although there is little evidence in support of this mechanism in the gravelly setting.

## 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 | **Warm Season** | | | 45–60 | |
| | black grama | BOER4 | *Bouteloua eriopoda* | 45–60 | – |
| | bush muhly | MUPO2 | *Muhlenbergia porteri* | 45–60 | – |
| 2 | **Warm Season** | | | 15–30 | |
| | cane bluestem | BOBA3 | *Bothriochloa barbinodis* | 15–30 | – |
| | Arizona cottontop | DICA8 | *Digitaria californica* | 15–30 | – |
| | plains bristlegrass | SEVU2 | *Setaria vulpiseta* | 15–30 | – |
| 3 | **Warm Season** | | | 3–5 | |
| | threeawn | ARIST | *Aristida* | 3–5 | – |
| 4 | **Warm Season** | | | 0–3 | |
| | burrograss | SCBR2 | *Scleropogon brevifolius* | 0–3 | – |
| 5 | **Warm Season** | | | 3–15 | |
| | feather pappusgrass | ENNEA | *Enneapogon* | 3–15 | – |
| | slim tridens | TRMUE | *Tridens muticus var. elongatus* | 3–15 | – |
| 6 | **Warm Season** | | | 3–15 | |

| | | | | | |
|---|---|---|---|---|---|
| 6 | **Warm Season** | | | 3–15 | |
| | Graminoid (grass or grass-like) | 2GRAM | *Graminoid (grass or grass-like)* | 3–15 | – |
| | low woollygrass | DAPU7 | *Dasyochloa pulchella* | 3–15 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 3–15 | – |
| **Shrub/Vine** | | | | | |
| 7 | **Shrub** | | | 45–60 | |
| | creosote bush | LATR2 | *Larrea tridentata* | 45–60 | – |
| 8 | **Shrub** | | | 9–15 | |
| | mariola | PAIN2 | *Parthenium incanum* | 9–15 | – |
| 9 | **Shrub** | | | 3–9 | |
| | yerba de pasmo | BAPT | *Baccharis pteronioides* | 3–9 | – |
| | littleleaf ratany | KRER | *Krameria erecta* | 3–9 | – |
| 10 | **Shrub** | | | 3–15 | |
| | American tarwort | FLCE | *Flourensia cernua* | 3–15 | – |
| | crown of thorns | KOSP | *Koeberlinia spinosa* | 3–15 | – |
| | littleleaf sumac | RHMI3 | *Rhus microphylla* | 3–15 | – |
| 11 | **Shrub** | | | 3–6 | |
| | whitethorn acacia | ACCO2 | *Acacia constricta* | 3–6 | – |
| | plains pricklypear | OPPO | *Opuntia polyacantha* | 3–6 | – |
| 12 | **Shrub** | | | 3–6 | |
| | broom snakeweed | GUSA2 | *Gutierrezia sarothrae* | 3–6 | – |
| 13 | **Shrub** | | | 3–15 | |
| | winterfat | KRLA2 | *Krascheninnikovia lanata* | 3–15 | – |
| **Forb** | | | | | |
| 14 | **Forb** | | | 15–30 | |
| | dwarf desertpeony | ACNA2 | *Acourtia nana* | 15–30 | – |
| | croton | CROTO | *Croton* | 15–30 | – |
| | buckwheat | ERIOG | *Eriogonum* | 15–30 | – |
| | woolly paperflower | PSTA | *Psilostrophe tagetina* | 15–30 | – |
| | globemallow | SPHAE | *Sphaeralcea* | 15–30 | – |
| 15 | **Annual Forbs** | | | 3–15 | |
| | Forb, annual | 2FA | *Forb, annual* | 3–15 | – |

| | | | | | |
|---|---|---|---|---|---|
| 16 | **Perennial Forbs** | | | 3–15 | |
| | Forb, perennial | 2FP | *Forb, perennial* | 3–15 | – |

**Table 8. Community 2.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|

## 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 inclded 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

Don Sylvester
Dr. Brandon Bestelmeyer

## 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:**