USDA Natural Resources
Conservation Service

# Ecological site R042CY151NM
# Limestone Hills

Last updated: 10/21/2024
Accessed: 05/10/2025

## 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 hills, low mountains, and foot slopes of higher mountains. Slopes range from 15 to 75 percent and average 20 percent. Soils are well-drained and shallow (< 20") to limestone bedrock.

## Associated sites

| | |
|---|---|
| R042CY152NM | **Shallow**<br>Shallow occurs on gravelly alluvial fans of higher limestone mountains. Slopes range from 5 to 20 percent. Soils are loamy, gravelly, and very shallow to a petrocalcic horizon also known as a root restricting layer. The reference plant community is mixed prairie grassland with scattered shrubs, trees, and forbs. |
| R042CY156NM | **Gravelly**<br>This rangeland ecological site occurs on gravelly alluvial fans of higher limestone mountains. Slopes range from 5 to 20 percent. Soils are deep gravelly loams. The reference plant community is mixed prairie grassland with scattered shrubs, trees, and forbs. |
| R042CY154NM | **Swale**<br>Swale sites often dissect the lower footslopes of Limestone Hills. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | (1) *Yucca* |
| Herbaceous | (1) *Bouteloua gracilis*<br>(2) *Bouteloua curtipendula* |

## Physiographic features

This site occurs as hills, low mountains, and foot slopes of higher mountains. Slopes range from 15 to 75 percent and average 20 percent. Elevation ranges from 4,000 to 7,000 feet above sea level. This site is a complex of soils, fractured limestone aspect and degree of slope. Aspect and elevation are important in the determination of species composition and production. Runoff is high to very high.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Hill<br>(2) Mountain slope |

| | |
|---|---|
| Elevation | 4,000–7,000 ft |
| Slope | 15–75% |

## Climatic features

The climate of this area is “semi-arid continental.”

Annual average precipitation ranges from 11 to 19 inches. Variations of 5 inches, more or less, are not uncommon. Approximately 70 percent of the precipitation occurs from May through October. Most of the summer rain comes in the form of high-intensity, short- uration thunderstorms. Winter moisture is usually negligible.

Temperatures are characterized by distinct seasonal changes and large annual and diurnal temperature changes. The average annual temperature ranges from 55 degrees to 60 degrees, with extremes of 20 degrees below zero in the winter to 110 degrees in the summer not uncommon.

The average frost-free season is 170 to 189 days. The last killing frost is in early April and the first killing frost is in mid October.

Both temperature (especially south slope)and precipitation favor warm-season species. However, approximately 40 percent of the precipitation (and temperature on north slopes) is favorable to to cool season growth at the middle to higher elevations. This could allow the cool season plants to occupy a very important part of this complex plant community. Due to the shallow soil profile, vegetation responds well to light rains. Moisture can also be stored relatively deep in the seams and cracks of fractured limestone. This moisture is also available for plant use. Slope aspect is also important when the strong winds from the west and southwest blow. These winds, which blow from February to June, cause the soil to dry during the critical growth stage for many cool season species. The north slopes are somewhat protected and do not dry as fast as the south slopes.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site.
Data interpreted utilizing NM NRCS Climate Summarizer spreadsheet.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 189 days |
| Freeze-free period (average) | 211 days |
| Precipitation total (average) | 19 in |

## 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 soils on this site are typically shallow over limestone. Pockets of deeper soils can exist usually occurring along seams and cracks in the fractured limestone. The soils are well drained. Permeability is moderate to moderately slow. Water-holding capacity is low except at seams and cracks in the limestone bedrock. Surface textures are cobbly loams, stony or rocky loams and cobbly silt loams. The soils of this site are over fractured limestone bedrock.

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Residuum–limestone |
| Surface texture | (1) Cobbly loam<br>(2) Very cobbly silt loam<br>(3) Very cobbly loam |
| Family particle size | (1) Loamy |

| | |
|---|---|
| Drainage class | Well drained |
| Permeability class | Moderately slow to moderate |
| Soil depth | 4–20 in |
| Surface fragment cover <=3" | 15–35% |
| Surface fragment cover >3" | 15–35% |
| Available water capacity (0-40in) | 3–6 in |
| Soil reaction (1:1 water) (0-40in) | 7.9–8.4 |
| Subsurface fragment volume <=3" (Depth not specified) | 15–35% |
| Subsurface fragment volume >3" (Depth not specified) | 15–35% |

## Ecological dynamics

The distribution of vegetation within the site is highly dependent on the local environment. Elevation, soil moisture, aspect, slope gradient, latitude, variability of the soils, and amount of rock outcrop are the major factors controlling plant species composition and distribution. Two Reference Plant Communities are recognized for this site. A midgrass/mixed shrub community occurs primarily on south facing slopes and ridgetops while a midgrass/tree/shrub savanna community occurs on north facing slopes.

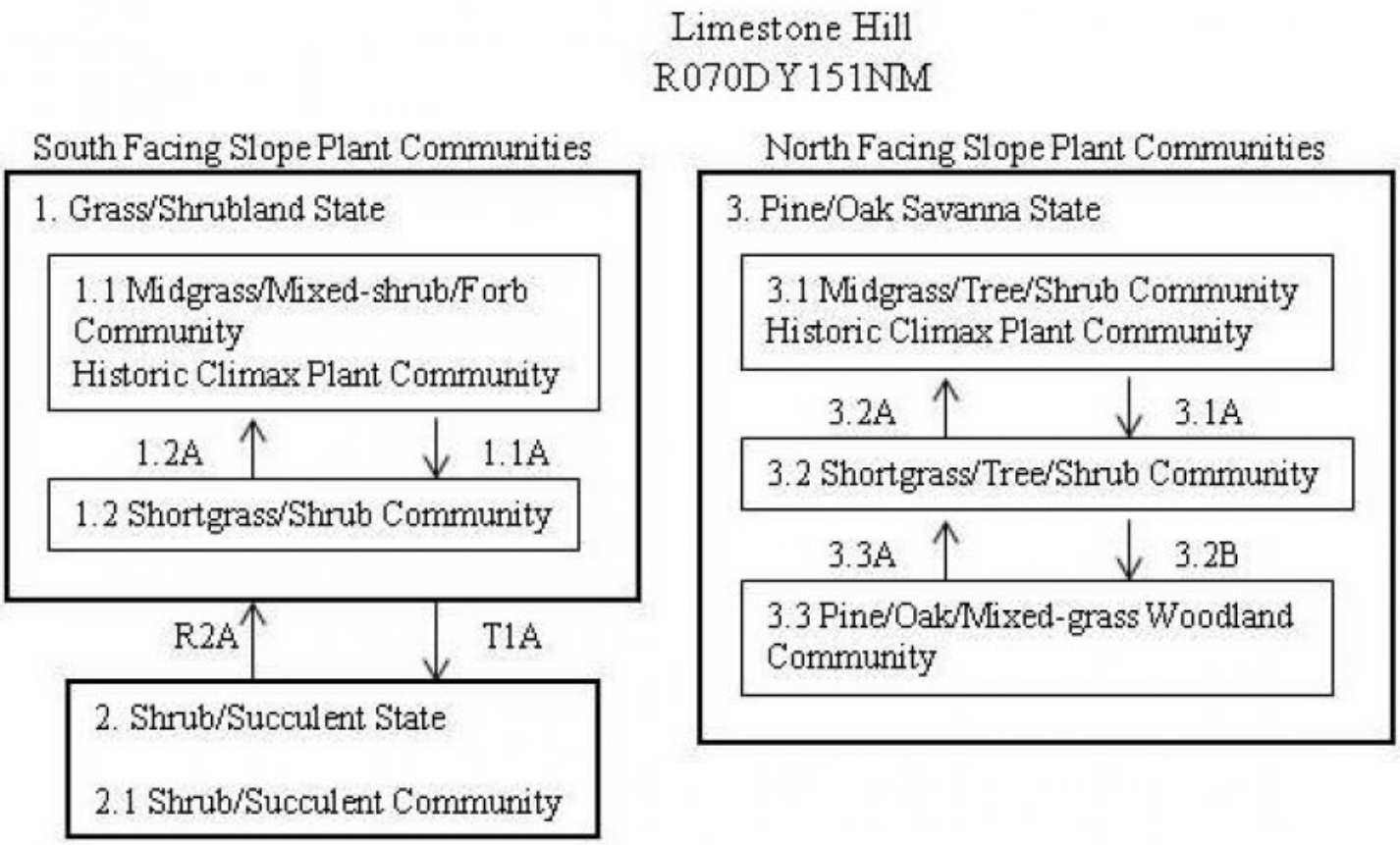
Historically, the site has evolved with native herbivores such as mule deer, desert bighorn sheep, and pronghorn antelope (on low relief areas in some areas.). Bison were not documented in the historical record as being present in any significant amount due to contributing factors such as lack of water and steep topography. Small lightning induced fires were mostly likely common mainly because of the adequate amount of fine fuels present.

Early records suggest cattle, sheep, goats, and horses were introduced into the southwest from Mexico in the mid-1500's. However, extensive ranching began in the 1880s. Sheep and goats grazed this site extensively up to the mid 1900s. Direct fire suppression and overutilization of plant resources in some areas most likely began during this time.

The impact of improper grazing within this site specifically will lead to a reduction of palatable midgrasses and forbs and an increase of woody plants such as juniper and catclaw acacia. In addition, direct fire suppression will also allow the woody plants to increase. On north facing slopes, fires can reopen somewhat dense woodlands if enough fine fuels are present.

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




Legend

1.1A Heavy Continuous Grazing, Fire Suppression
1.2A Prescribed or No Grazing, Prescribed Burning (low relief areas)
T1A Improper Grazing Management, Fire Suppression,
R2A, Prescribed or No Grazing and Prescribed Burning (low relief areas and if adequate fuels is present)
3.1A Heavy Continuous Grazing, No Fire
3.2A Prescribed or No Grazing, Prescribed Burning
3.2B Heavy Continuous Grazing, No Fire
3.3A Prescribed or No Grazing and Prescribed Burning (if fine fuels have recovered)

**State 1**
**Grass/Shrubland State - South Facing Slopes**

The Midgrass/Mixed-shrub/Forb community is characterized by midgrasses such as blue grama, sidoats grama, curlyleaf muhly, and black grama and shrubs such as yuccas, sotol, ocotillo, and lechuguilla. Some redberry juniper and wavyleaf oak along with a higher productivity of grasses can be found in some south facing slopes, usually in higher elevations or in areas transitioning to a cooler and wetter climate. The overall warmer and drier soil climate in this community limits trees such as pinyon pine and gray oak. In more mesic areas where this site occurs such as Guadalupe Mountains National Park, fine fuel productivity is higher and fire does play a role in suppression shrubs. The Shortgrass/Shrub community is the result of palatable grasses such as blue grama and black grama decreasing while unpalatable grasses such as threeawns, hairy grama, slim tridens increase. Annual grasses and forbs are more abundant in this phase.

**Community 1.1**
**Midgrass/Mixed-shrub/Forb Community**

**Figure 4. 1.1 Midgrass/Mixed-shrub/Forb Community**

This plant community occurs primarily on south facing slopes and ridgetops. The community is characterized by midgrasses such as blue grama, sidoats grama, curlyleaf muhly, and black grama and shrubs such as yuccas, sotol, ocotillo, lechuguilla. Some redberry juniper and wavyleaf oak along with a higher productivity of grasses can be found in some south facing slopes, usually in higher elevations or in areas transitioning to a cooler and wetter climate. The overall warmer and drier soil climate in this community limits trees such as pinyon pine and gray oak. In some areas fire probably is not very influential is shaping the plant communities due to continuities in fine fuels limit the extent and frequency of fires. In more mesic areas where this site occurs such as Guadalupe Mountains National Park, fine fuel productivity is higher and fire does play a role in suppression shrubs.

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

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 480 | 640 | 800 |
| Shrub/Vine | 200 | 300 | 400 |
| Forb | 30 | 40 | 50 |
| Tree | 0 | 0 | 0 |
| **Total** | **710** | **980** | **1250** |

**Table 6. Ground cover**

| | |
|---|---|
| Tree foliar cover | 10% |
| Shrub/vine/liana foliar cover | 10% |
| Grass/grasslike foliar cover | 0% |
| Forb foliar cover | 0% |
| Non-vascular plants | 0% |
| Biological crusts | 0% |
| Litter | 10-15% |
| Surface fragments >0.25" and <=3" | 0% |
| Surface fragments >3" | 0% |
| Bedrock | 0% |
| Water | 0% |
| Bare ground | 10-18% |

**Figure 6. Plant community growth curve (percent production by month). NM4601, R070DY151NM Limestone Hills Reference State. R070DY151NM Limestone Hills Reference State A mixed mid/tall, warm/cool-season grassland with a major shrub, half-shrub and forb component..**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 3 | 5 | 10 | 10 | 25 | 30 | 12 | 5 | 0 | 0 |

### Community 1.2
### Shortgrass/Shrub Community

This plant community is the result of heavy continuous grazing. Palatable grasses such as blue grama and black grama decrease while unpalatable grasses such as threeawns, hairy grama, and slim tridens increase. Sideoats grama initially increases following overgrazing and will ultimately decrease with continued overgrazing. Annual grasses and forbs are more abundant in this phase. Fine fuels will have to recover before prescribed fire is an option on low relief areas. Prescribed fire is usually not attempted on very steep rocky slopes.

### Pathway 1.1A
### Community 1.1 to 1.2

With heavy continuous grazing pressure and fire suppression, the Midgrass/Mixed-shrub/Forb Community will shift to the Shortgrass/Shrub Community.

### Pathway 1.2A
### Community 1.2 to 1.1

With Prescribed or No Grazing and Prescribed Burning in low relief areas conservation practices implemented, the Shortgrass/Shrub Community can be restored to the Midgrass/Mixed-shrub/Forb Community.

**Conservation practices**

| |
|---|
| Prescribed Burning |
| Prescribed Grazing |

## State 2
## Shrub/Succulent State - South Facing Slopes

The Shrub/Succulent State is the result of heavy continuous grazing. Abundant increaser shrubs (> 35% cover) such as lechuguilla and/or sotol are indicators of this community. There are some areas with abundant ocotillo and it is unknown if this is completely attributed to past disturbances such as heavy continuous grazing or if they with are within the inherent variability of the site. Restoration practices are very limited in this state. Steepness and rough slopes prevents many brush management treatments such as chemical and/or mechanical treatments. Fine fuels will have to recover before prescribed fire is an option on low relief areas. Prescribed fire is usually not attempted on very steep rocky slopes.

### Community 2.1
### Shrub/Succulent Community

This state is characterized by the predominance of shrubs and/or succulents, with perennial grasses as the subordinate component and is resulted by heavy continuous grazing. Juniper may dominate at mid to higher elevations. Pinchot juniper has a limited distribution in New Mexico and is typically the dominant in the CP-4 resource unit at mid-elevations in the Guadalupe Mountains. Oneseed and alligator juniper have a wider distribution and may dominate a mid-to higher elevations on Limestone Hills throughout most of CP-4. At lower elevations, catclaw mimosa may dominate in localized areas, often forming dense thickets along headers and drainageways. Blue grama is often the primary grass species associated with increased densities of juniper, while threeawns, tridens, hairy grama, and black grama are more strongly associated with catclaw mimosa. Sotol, agave species, sacahuista, or cholla may become the dominant succulent with greater than 35% canopy cover. Sotol and agave are often co-dominant in localized areas, usually on south and west aspects along side slopes of hills. It may be that local dominance by sotol and or agave is natural and due to their adaptability on the shallower rocky limestone soils. Sacahuista is better adapted to the cooler north and east aspects and may dominate with sideoats and curlyleaf muhly as subordinate species. On the slightly deeper soils of ridge tops and benches historically overgrazed by

sheep, cholla may be the dominant species with mat muhly occurring as a sub-dominant. There are some areas with abundant ocotillo and it is unknown if this is completely attributed to past disturbances such as heavy continuous grazing or if they with are within the inherent variability of the site. Restoration practices are very limited in this state. Steepness and rough slopes prevents many brush management treatments such as chemical and/or mechanical treatments. Fine fuels will have to recover before prescribed fire is an option on low relief areas. Prescribed fire is usually not attempted on very steep rocky slopes.

## State 3
## Pine/Oak Savanna State - North Facing Slopes

The Midgrass/Tree/Shrub Community (3.1) is the reference community for the north facing slopes or in mesic areas of the site. Pinyon pine, redberry juniper, wavyleaf oak are scattered among grasses such as blue grama, sideoats grama, curlyleaf muhly, New Mexico muhly, and New Mexico feathergrass. The Shortgrass/Tree/Shrub Community (3.2) is the result of heavy continuous grazing. Palatable grasses such as blue grama and New Mexico muhly decrease while unpalatable grasses such as threeawns, hairy grama, slim tridens increase. The Pine/Oak/Mixed-grass Woodland Community (3.3) is the result of heavy continuous grazing which reduces the fine fuels needed to carry a fire. This phase can also result from fire suppression alone. Canopy cover of pinyon pine is greater than 50 percent.

### Community 3.1
### Midgrass/Tree/Shrub Community

**Figure 7. North Facing Slopes in Background**

This plant community is the reference on north facing slopes or in mesic areas of the site. Pinyon pine, redberry juniper, wavyleaf oak are scattered among grasses such as blue grama, sideoats grama, curlyleaf muhly, New Mexico muhly, and New Mexico feathergrass. Pine muhly can be found in places. Common shrubs include mountain mahogany, desert ceanothus, and agarito. Canopy cover of pinyon ranges from 10-50 percent depending on fire history. Natural fires play an important role in maintaining this community.

**Table 7. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 700 | 900 | 1500 |
| Shrub/Vine | 200 | 300 | 400 |
| Tree | 50 | 100 | 200 |
| Forb | 30 | 40 | 50 |
| **Total** | **980** | **1340** | **2150** |

### Community 3.2
### Shortgrass/Tree/Shrub Community

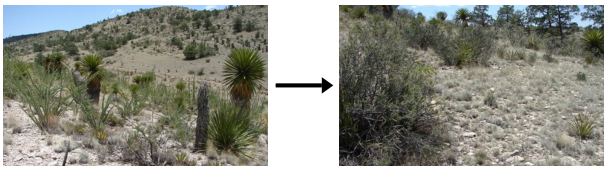
**Figure 9. 3.2 Shortgrass/Tree/Shrub Community**

This plant community is the result of heavy continuous grazing. Palatable grasses such as blue grama and New Mexico muhly decrease while unpalatable grasses such as threeawns, hairy grama, and slim tridens increase. Sideoats grama initially increases following overgrazing and will ultimately decrease with continued overgrazing. Annual grasses and forbs are more abundant in this phase.

## Community 3.3
## Pine/Oak/Mixed-grass Woodland Community

This plant community is the result of heavy continuous grazing which reduces the fine fuels needed to carry a fire. This phase can also result from fire suppression alone. Canopy cover of pinyon pine is greater than 50 percent. Prescribed grazing or no grazing will allow herbaceous plants to recover and will allow fires to reduce the canopy cover of pinyon pine. Wavyleaf oak will resprout readily after fires and possibily increase in abundance after fire depending on herbivory.

## Pathway 3.1
## Community 3.1 to 3.2

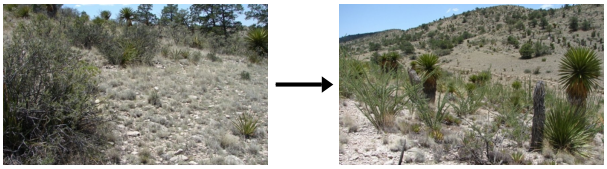


**Midgrass/Tree/Shrub Community**

**Shortgrass/Tree/Shrub Community**

With heavy continuous grazing and no fires, the Midgrass/Tree/Shrub Community will shift to the Shortgrass/Tree/Shrub Community.

## Pathway 3.2A
## Community 3.2 to 3.1



**Shortgrass/Tree/Shrub Community**

**Midgrass/Tree/Shrub Community**

With Prescribed or No Grazing and Prescribed Burning conservation practices implemented, the Shortgrass/Tree/Shrub Community can be reverted to the Midgrass/Tree/Shrub Community.

### Conservation practices

| |
|---|
| Prescribed Burning |

| |
|---|
| Prescribed Grazing |

### Pathway 3.2B
### Community 3.2 to 3.3

With heavy continuous grazing and no fires, the Shortgrass/Tree/Shrub Community will shift to the Pine/Oak/Mixed-grass/Woodland Community.

### Pathway 3.3A
### Community 3.3 to 3.2

With the implementation of various conservation practices including Prescribed or No Grazing and Prescribed Burning (if the fine fuels are available), the Pine/Oak/Mixed-grass Woodland Community can be restored to the Shortgrass/Tree/Shrub Community.

**Conservation practices**

| |
|---|
| Prescribed Burning |
| Prescribed Grazing |

### Transition T1A
### State 1 to 2

With improper grazing management and fire suppression, the Grass/Shrubland State will transition into the Shrub/Succulent State.

### Restoration pathway R2A
### State 2 to 1

With Prescribed or No Grazing and Prescribed Burning (only at low relief areas and where adequate fuel are present) conservation practices applied to the plant community, the Shrub/Succulent State can be restored to the Grass/Shrubland State.

**Conservation practices**

| |
|---|
| Prescribed Burning |
| Prescribed Grazing |

## Additional community tables

**Table 8. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Warm-season stoloniferous** | | | 96–160 | |
| | black grama | BOER4 | *Bouteloua eriopoda* | 96–160 | – |
| 2 | **Warm-season mid/tallgrasses** | | | 168–280 | |
| | sideoats grama | BOCU | *Bouteloua curtipendula* | 60–200 | – |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 60–200 | – |
| | curlyleaf muhly | MUSE | *Muhlenbergia setifolia* | 50–150 | – |
| 3 | **Warm-season midgrasses** | | | 120–200 | |
| | Arizona cottontop | DICA8 | *Digitaria californica* | 50–125 | – |
| | sand dropseed | SPCR | *Sporobolus cryptandrus* | 40–100 | – |

| | | | | | |
|---|---|---|---|---|---|
| | streambed bristlegrass | SELE6 | *Setaria leucopila* | 30–90 | – |
| 4 | **Cool-season midgrasses** | | | 48–80 | |
| | New Mexico feathergrass | HENE5 | *Hesperostipa neomexicana* | 30–80 | – |
| | southwestern needlegrass | ACEM4 | *Achnatherum eminens* | 15–50 | – |
| 5 | **Warm-season mid/shortgrasses** | | | 48–80 | |
| | common wolfstail | LYPH | *Lycurus phleoides* | 15–45 | – |
| | slim tridens | TRMU | *Tridens muticus* | 8–25 | – |
| | threeawn | ARIST | *Aristida* | 8–25 | – |
| | hairy grama | BOHI2 | *Bouteloua hirsuta* | 8–25 | – |
| | fall witchgrass | DICO6 | *Digitaria cognata* | 8–25 | – |
| | low woollygrass | DAPU7 | *Dasyochloa pulchella* | 3–10 | – |
| 6 | **Annuals** | | | 0–10 | |
| | Forb, annual | 2FA | *Forb, annual* | 0–10 | – |
| **Forb** | | | | | |
| 7 | **Perennial Forbs** | | | 30–50 | |
| | dropseed | SPORO | *Sporobolus* | 12–61 | – |
| | tridens | TRIDE | *Tridens* | 12–61 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 3–10 | – |
| | damianita | CHME3 | *Chrysactinia mexicana* | 3–10 | – |
| | croton | CROTO | *Croton* | 3–10 | – |
| | buckwheat | ERIOG | *Eriogonum* | 3–10 | – |
| | Gregg's tube tongue | JUPI5 | *Justicia pilosella* | 3–10 | – |
| | tansyaster | MACHA | *Machaeranthera* | 3–10 | – |
| | mallow | MALVE | *Malvella* | 3–10 | – |
| | evening primrose | OENOT | *Oenothera* | 3–10 | – |
| | Texas snoutbean | RHSET | *Rhynchosia senna var. texana* | 3–10 | – |
| | pricklyleaf dogweed | THAC | *Thymophylla acerosa* | 3–10 | – |
| | vervain | VERBE | *Verbena* | 3–10 | – |
| | desert zinnia | ZIAC | *Zinnia acerosa* | 3–10 | – |
| 8 | **Annual Forbs** | | | 0–5 | |
| | green sprangletop | LEDU | *Leptochloa dubia* | 61–123 | – |
| | Forb, annual | 2FA | *Forb, annual* | 0–5 | – |
| | bladderpod | LESQU | *Lesquerella* | 0–3 | – |
| **Shrub/Vine** | | | | | |
| 9 | **Tall Shrubs** | | | 100–200 | |
| | ocotillo | FOSP2 | *Fouquieria splendens* | 15–100 | – |
| | Pinchot's juniper | JUPI | *Juniperus pinchotii* | 10–75 | – |
| | pungent oak | QUPU | *Quercus pungens* | 10–75 | – |
| | Graminoid (grass or grass-like) | 2GRAM | *Graminoid (grass or grass-like)* | 12–61 | – |
| | resinbush | VIST | *Viguiera stenoloba* | 15–50 | – |
| | catclaw acacia | ACGR | *Acacia greggii* | 10–25 | – |
| | desert myrtlecroton | BEOB | *Bernardia obovata* | 10–25 | – |
| | jointfir | EPHED | *Ephedra* | 10–25 | – |

| | | | | | |
|---|---|---|---|---|---|
| | Texas swampprivet | FOAN | *Forestiera angustifolia* | 10–25 | – |
| 10 | **Subshrubs** | | | 50–100 | |
| | silver prairie clover | DABIA | *Dalea bicolor var. argyrea* | 10–25 | – |
| | featherplume | DAFO | *Dalea formosa* | 5–15 | – |
| | gumhead | GYGL | *Gymnosperma glutinosum* | 5–15 | – |
| | littleleaf ratany | KRER | *Krameria erecta* | 5–15 | – |
| | showy menodora | MELO2 | *Menodora longiflora* | 5–15 | – |
| | rough menodora | MESC | *Menodora scabra* | 5–15 | – |
| | mariola | PAIN2 | *Parthenium incanum* | 5–15 | – |
| 11 | **Fibrous/Succulents** | | | 50–100 | |
| | lechuguilla | AGLE | *Agave lechuguilla* | 5–25 | – |
| | tree cholla | CYIMI | *Cylindropuntia imbricata var. imbricata* | 10–25 | – |
| | green sotol | DALE2 | *Dasylirion leiophyllum* | 10–25 | – |
| | sacahuista | NOMI | *Nolina microcarpa* | 10–25 | – |
| | pricklypear | OPUNT | *Opuntia* | 10–25 | – |
| | yucca | YUCCA | *Yucca* | 10–25 | – |

**Table 9. Community 3.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | **Warm-season mid/tallgrasses** | | | 280–600 | |
| | sideoats grama | BOCU | *Bouteloua curtipendula* | 140–400 | – |
| | blue grama | BOGR2 | *Bouteloua gracilis* | 140–400 | – |
| 2 | **Warm-season midgrassess** | | | 210–450 | |
| | longawn muhly | MUSP4 | *Muhlenbergia spiciformis* | 50–200 | – |
| | curlyleaf muhly | MUSE | *Muhlenbergia setifolia* | 50–150 | – |
| | plains lovegrass | ERIN | *Eragrostis intermedia* | 25–100 | – |
| | green sprangletop | LEDU | *Leptochloa dubia* | 25–100 | – |
| | slender muhly | MUTE4 | *Muhlenbergia tenuifolia* | 25–75 | – |
| | streambed bristlegrass | SELE6 | *Setaria leucopila* | 25–75 | – |
| 3 | **Cool-season midgrasses** | | | 140–300 | |
| | New Mexico feathergrass | HENE5 | *Hesperostipa neomexicana* | 30–200 | – |
| | southwestern needlegrass | ACEM4 | *Achnatherum eminens* | 30–100 | – |
| | littleawn needlegrass | ACLO7 | *Achnatherum lobatum* | 25–75 | – |
| | pinyon ricegrass | PIFI | *Piptochaetium fimbriatum* | 25–75 | – |
| 4 | **Warm-season mid/shortgrasses** | | | 70–150 | |
| | threeawn | ARIST | *Aristida* | 15–30 | – |
| | hairy grama | BOHI2 | *Bouteloua hirsuta* | 15–30 | – |
| | common wolfstail | LYPH | *Lycurus phleoides* | 15–30 | – |
| | slim tridens | TRMU | *Tridens muticus* | 10–25 | – |
| | fall witchgrass | DICO6 | *Digitaria cognata* | 15–25 | – |
| 5 | **Annuals** | | | 0–10 | |
| | Grass, annual | 2GA | *Grass, annual* | 0–10 | |

| | | | | | |
|---|---|---|---|---|---|
| | Grass, annual | 2GA | *Grass, annual* | 0–10 | – |
| **Forb** | | | | | |
| 6 | **Perennial Forbs** | | | 30–50 | |
| | Forb, perennial | 2FP | *Forb, perennial* | 3–10 | – |
| | damianita | CHME3 | *Chrysactinia mexicana* | 3–10 | – |
| | croton | CROTO | *Croton* | 3–10 | – |
| | buckwheat | ERIOG | *Eriogonum* | 3–10 | – |
| | Gregg's tube tongue | JUPI5 | *Justicia pilosella* | 3–10 | – |
| | tansyaster | MACHA | *Machaeranthera* | 3–10 | – |
| | mallow | MALVE | *Malvella* | 3–10 | – |
| | evening primrose | OENOT | *Oenothera* | 3–10 | – |
| | Texas snoutbean | RHSET | *Rhynchosia senna var. texana* | 3–10 | – |
| | pricklyleaf dogweed | THAC | *Thymophylla acerosa* | 3–10 | – |
| | vervain | VERBE | *Verbena* | 3–10 | – |
| | desert zinnia | ZIAC | *Zinnia acerosa* | 3–10 | – |
| 7 | **Annual Forbs** | | | 0–5 | |
| | Forb, annual | 2FA | *Forb, annual* | 0–5 | – |
| | bladderpod | LESQU | *Lesquerella* | 0–3 | – |
| **Shrub/Vine** | | | | | |
| 8 | **Tall shrubs** | | | 150–300 | |
| | pungent oak | QUPU | *Quercus pungens* | 25–200 | – |
| | skunkbush sumac | RHTR | *Rhus trilobata* | 25–100 | – |
| | Pinchot's juniper | JUPI | *Juniperus pinchotii* | 25–100 | – |
| | alderleaf mountain mahogany | CEMO2 | *Cercocarpus montanus* | 15–75 | – |
| | desert ceanothus | CEGR | *Ceanothus greggii* | 15–50 | – |
| | resinbush | VIST | *Viguiera stenoloba* | 10–35 | – |
| | cliff fendlerbush | FERU | *Fendlera rupicola* | 15–35 | – |
| | jointfir | EPHED | *Ephedra* | 10–25 | – |
| | catclaw acacia | ACGR | *Acacia greggii* | 10–25 | – |
| | Texas swampprivet | FOAN | *Forestiera angustifolia* | 5–15 | – |
| 9 | **Subshrubs** | | | 30–60 | |
| | showy menodora | MELO2 | *Menodora longiflora* | 10–20 | – |
| | rough menodora | MESC | *Menodora scabra* | 10–20 | – |
| | silver prairie clover | DABIA | *Dalea bicolor var. argyrea* | 5–15 | – |
| | featherplume | DAFO | *Dalea formosa* | 5–15 | – |
| | gumhead | GYGL | *Gymnosperma glutinosum* | 3–5 | – |
| 10 | **Fibrous/Succulents** | | | 20–40 | |
| | green sotol | DALE2 | *Dasylirion leiophyllum* | 5–25 | – |
| | sacahuista | NOMI | *Nolina microcarpa* | 5–25 | – |
| | banana yucca | YUBA | *Yucca baccata* | 5–25 | – |
| | pricklypear | OPUNT | *Opuntia* | 5–10 | – |
| | Parry's agave | AGPAN6 | *Agave parryi ssp. neomexicana* | 3–10 | – |
| | tree cholla | CYIMI | *Cylindropuntia imbricata var. imbricata* | 5–10 | – |

## Inventory data references

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

This site has been mapped and correlated with soils in the following soil surveys:
Otero, Eddy, Chaves, Lincoln

## Other references

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## Approval

Kendra Moseley, 10/21/2024

## 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 | 05/10/2025 |

| | |
|---|---|
| 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:

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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:**

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