USDA Natural Resources Conservation Service

Ecological site R077CY052NM
Loamy Sand

Last updated: 9/11/2023
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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.

MLRA notes

Major Land Resource Area (MLRA): 077C–Southern High Plains, Southern Part

MLRA 77C is characterized by nearly level plains with numerous playa depressions, moderately sloping breaks along drainageways, and a steep escarpment along the eastern margin. From southwest to northeast, soils grade from coarse-textured to finetextured. Soils are generally deep and occur in a thermic soil temperature regime and ustic soil moisture regime bordering on aridic.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

This site occurs on deep loamy sands in the western portion of the MLRA. The reference vegetation consists of tall and midgrasses few forbs and shrubs. Abusive grazing practices can lead to a shift away from the reference plant community. Also the lack of fire or other brush management may lead to an increase in woody species.

Associated sites

R077CY034TX	**Sand Hills 16-21" PZ** The Sand Hills site will occur adjacent to and in association with Loamy Sand sites. Sand Hills may occur as rolling dunes or small to large islands scattered throughout the Loamy Sand and Sand Plains sites.
R077CY035TX	**Sandy 16-21" PZ** The Sandy site is on plains, dunes, and interdunes and is adjacent to the Loamy Sand sites. These sites may occur as deep coarse sandy areas in small to large islands scattered throughout the Loamy Sand and Sand Plains sites. Midgrasses, tallgrasses, and shrubs dominate these sites.
R077CY028TX	**Limy Upland 16-21" PZ** The Limy Upland is on plains, interdunes, and playa slopes. This site is associated with Loamy Sand sites that are on slightly lower landscape positions. Midgrasses and shortgrasses dominate these sites.

Similar sites

R077CY056NM	**Sandy Plains** Sandy Plains are similar to Loamy Sand sites in surface soil texture and that both sites occur on level plains interspersed with sand hills and dunes and support a high percentage of tall grasses in the reference community. Sandy Plains typically has a diagnostic high calcium accumulation layer at approximately 25 to 40 inches. This layer may also be represented as a calcium carbonate layer or grade in hardness to a petrocalcic layer.
R077DY046TX	**Sandy 12-17" PZ** This site occurs on very deep, loamy fine sand soils on gently rolling uplands. Mean annual precipitation is lower (15 to 17 inches) and this site is less productive than the Loamy Sand site in MLRA 77C. The reference vegetation includes tall and midgrasses with forbs and few shrubs.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia filifolia* (2) *Yucca*
Herbaceous	(1) *Andropogon hallii* (2) *Schizachyrium scoparium*

Physiographic features

This site occurs on nearly level to gently undulating plains. Slopes range from 0 to 2 percent but are usually less than 1 percent. Direction of slope varies and is not
significant. Elevation ranges from 3,600 to 4,800 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Plateau > Plain
Runoff class	Negligible to very low
Flooding frequency	None
Ponding frequency	None
Elevation	3,600–4,800 ft
Slope	0–2%
Aspect	W, NW, N, NE, E, SE, S, SW

Climatic features

The climate of this area can be classified as “semi-arid continental”.

Precipitation averages from about 15 to 16 inches annually with approximately 75 percent of this yearly moisture

falling during the period of May through October. Most summer rainfall is associated with usually brief afternoon and evening thundershowers, which occasionally produce heavy rain over a small area, and sometimes bring a little hail. Winters are generally dry, with only one or two days a month when as much as one-tenth inch of moisture falls. However, winter average 20 inches of snow, although most snowfalls are light with an occasional storm producing up to six inches. Following these storms, snow may lie on the ground for several days and occasionally moderate to strong winds accompanying these storms result in blizzard conditions and heavy drifting. Although the precipitation patterns favor the production of warm-season plants, sufficient moisture is received in the late winter and the spring to support cool-season plants. Approximately 25 percent of the annual precipitation is received during April and May. May is generally the wettest month followed by July and then August.

Temperatures show the seasonal changes and large annual and diurnal ranges characteristic of such a climate. Summers are generally mild. The high daily temperature reading exceed 90 degrees F about one-third of the time, and readings of 100 degrees F occur about once a year. Rapid cooling after sundown results in minimum temperatures below 60 degrees F on most nights, even in midsummer. Winter shade temperatures usually rise to the mid-40’s and an average of only 15 days fail to see temperatures rise above the freezing mark most of the time from early November through March; below zero readings occur on an average of only three times a year.

The freeze-free season ranges from 168 days to 171 days between April 28th to October 16th. Both temperatures and annual precipitation favor warm-season plants. About 40 percent of the annual precipitation is received during the season where temperatures will benefit cool-season plants and only 10 percent falls during the dormant season.

While open to winter invasions of arctic air over the Great Plains, this area is far enough south and west to miss many of these outbreaks. Mountains to the north and west intercept much of the precipitation from the Pacific northwest storms coming through this area during the winter. An average hourly wind velocity for the year is 15 miles per hour. Somewhat higher winds prevail during the spring months, but velocities exceeding 24 mile per hour are experienced only 10 percent of the usual year. Stronger winds blow chiefly from a westerly or southwesterly direction during the spring. Relative humidity is moderately low.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

Table 3. Representative climatic features

Frost-free period (characteristic range)	150-167 days
Freeze-free period (characteristic range)	186-196 days
Precipitation total (characteristic range)	17-18 in
Frost-free period (actual range)	146-184 days
Freeze-free period (actual range)	182-204 days
Precipitation total (actual range)	15-19 in
Frost-free period (average)	160 days
Freeze-free period (average)	191 days
Precipitation total (average)	17 in

Climate stations used

- (1) CROSSROADS 2 [USC00292207], Crossroads, NM
- (2) MELROSE [USC00295617], Melrose, NM
- (3) PORTALES [USC00297008], Portales, NM
- (4) RAGLAND 3 SSW [USC00297226], McAlister, NM
- (5) DENVER CITY [USC00412408], Denver City, TX

Influencing water features

Water features are not an influencing factor in this site.

Wetland description

N/A

Soil features

These are deep, well drained soils. The surface textures are fine sand and loamy fine sand. The texture of the subsurface layers is sandy clay loam which, occurs at depths of 20 to 40 inches. Permeability is moderate. The available water-holding capacity is low. The effective rooting depth is about 50 inches. Moisture that falls on this site is readily absorbed. Winter and early spring moisture can be stored in the subsoils for earlier green-up by the deeper-rooted plants. The surface soils, if unprotected by plant cover and organic residues, become wind-blown, and low hummocks are formed.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–metamorphic and sedimentary rock
Surface texture	(1) Loamy fine sand (2) Fine sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	60–72 in
Available water capacity (0-40in)	3–6 in
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	15–35%

Ecological dynamics

The Loamy Sand ecological site is found on nearly level to gently sloping soils in interdune areas and sloping playa terraces and plains. Surface soils are primarily fine sandy loams and fine sands. The very deep to deep course textured soils are well drained and have moderate permeability. Violent effervescence with the standard acid test will be observed in Arch soils in all layers. Brownfield soils have strong effervescence at 60 inches. These are slightly to strongly alkaline soils. This alkaline zone at whatever depth within the root zone has a limiting effect on plant uptake of soil supplied nutrients. These soil characteristics favor plants with root systems that fully utilize the deep soils and can accommodate the nutrient limiting effects of alkaline effected soils. Because of the normal monsoonal rainfall pattern, most plant growth takes place from late spring to fall favoring vegetation consisting of tall and mid height warm-season bunchgrasses.

The Reference Community of the Loamy Sand Ecological Site in MLRA 77C is a Tall-Midgrass Grassland Community (1.1). It supports a stand of dominantly tall and midgrasses and widely scattered shrubs most of which are mottes of Sand Shinnery/Havard oak and a variety of forbs. Characteristic tall grasses included little and sand bluestems and sand and spike dropseeds. Midgrasses such as sideoats grama, giant dropseed and lower stature grass species like black grama, three-awns, and red lovegrass provided most of the annual production. See the Plant Composition and Annual Production Table below for estimated composition and production of the species present in the reference/diagnostic community.
Pre-settlement disturbances included frequent re-occurring droughts and fires and grazing or browsing by endemic pronghorn antelope and enormous herds of migratory bison. It is anticipated that herbivory was heavy following fires

but, because of fire induced migration, a long recovery period followed. The seasonal availability of water would also influence the frequency and intensity of bison grazing. Wildfires re-occurred at frequent intervals (Frost 1998) suppressing woody species. European settlement beginning around 1820 followed by active fire suppression around communities and passive fire suppression caused by domestic livestock grazing removing fine fuels needed for fire spread. This chain of events reduced fire frequency and intensity to give the competitive advantage to woody plants; especially re-sprouters. The interaction of grazing and fire suppression changed the composition and structure of the reference/diagnostic community dramatically on most areas of this site. Most of the areas correlated to this ESD are currently shrub dominated unless reoccurring brush management practices have been applied.

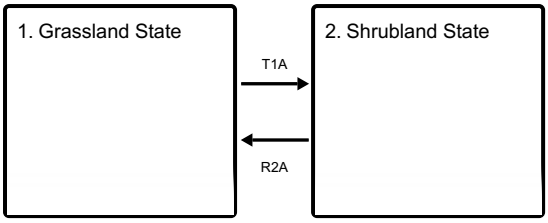
Inappropriate livestock grazing causes a reduction of more palatable species, such as the native bluestems and dropseeds. The mechanism of decline for high palatable tall and mid grasses is through a combination of repeat defoliation in the growing season and the detrimental effect of that on individual plant longevity. The year after year removal of seed heads and the potential for regeneration by seed this represents has a negative impact on post disturbance site recovery. This reduction in herbaceous cover and litter leads directly to a decline in soil cover, organic matter, soil stability and reduced fire frequency. Woody, and herbaceous increasers are generally endemic species released from competition from grasses and aided by a significantly altered fire regimen. Sand shinnery/Havard oak, honey mesquite, and sand sagebrush expand their influence to dominate the ecological processes on the site. Droughts, characteristic of the region, contribute to shifting from a Tall and midgrass dominated community (1.1) to a Midgrass/Shrubs Community (1.2). Perennial grasses still dominate annual herbage production in this community phase, but woody species increase proportionally to herbaceous plant decline. This is the at-risk phase of the reference state.

Over time with continued loss of foliar cover contributing to the reduction of fire frequency, leads to an increase in shrubs. The Midgrass/Shrubs Community (1.2) transitions into woody plants; The Shrubland State (2). Severe droughts, which occur at approximately 10-year intervals in this region, amplify this situation. It is thought that shrubs better survive droughts because they have extensive root systems that occupy the majority of all levels of the soil. During the transition, grazing-resistant grasses such as perennial three-awns, and lovegrasses as well as less palatable forbs begin replacing the tall and midgrasses. As the grass cover declines, litter, mulch, soil organic matter and soil stability declines. Bare ground, erosion and other desertification processes increase. This trend can be reversed, or at least slowed under the present climate, with proper grazing management and brush suppression practices, such as fire or chemical or mechanical brush management. Rest from grazing alone will not restore the Tall/Midgrass Community (1.1). A threshold is reached when the woody plant community exceeds 20 percent canopy, the plants reach fire resistant age and/or reproductive maturity. The Midgrass/Shrubs Community (1.2) transitions into the Mixed Shortgrass-Shrub Community (2.1). Shrubs now dominate production and other ecological processes. Reversal of this transition is not possible without accelerating conservation and management practices that manage woody increaser and invader expansion. Once shrubs become dominant, prescribed burning is not an option because fine fuel quantity and continuity is limited.

Sand Shinnery/Havard oak and honey mesquite dominate the Mixed Shortgrass-Shrub Community (2.1). Sand Shinnery/Havard oak dominates in the slightly deeper fine sand soils, while honey mesquite usually becomes dominant in the more loamy fine sand components. The grass component is a mixture of low palatability grasses, low quality forbs and annuals. With continued loss of foliar cover of grasses, the more palatable tall and midgrasses continue to decrease and are replaced by shortgrasses, such as hooded windmillgrass, sand dropseed and threeawns. In early stages (20-30% shrub cover) the increase of shrub species can be reversed with relatively inexpensive brush control practices such as chemical aerial applications and/or individual plant treatments along with grazing management that emphasizes accumulation of plant litter, soil organic matter and soil stability. Generally, prescribed burning is not an option once this site has reached phase 2.1. The lack of fine fuel and poor continuity limits prescribed burning effectiveness. The high possibility of wind erosion generally excludes mechanical brush control treatments, but herbicide treatments can be effective. If these practices are not applied, the woody species will continue to increase in dominance. As the brush canopy approaches 50 percent, annual production for the herbaceous species is limited to low quality perennial shortgrasses and annual grasses and forbs within shrub interspaces. This plant community, the Shrubs/Shortgrass/Annuals Community (2.2), becomes a stable shrubland, dominated by either Sand Shinnery/Havard oak or honey mesquite; or both. Reversal of this plant type requires extensive reclamation practices. Under continued inappropriate grazing and extended drought conditions dunes can form. In extreme cases they can form and move off-site, altering surrounding sites.

State and transition model

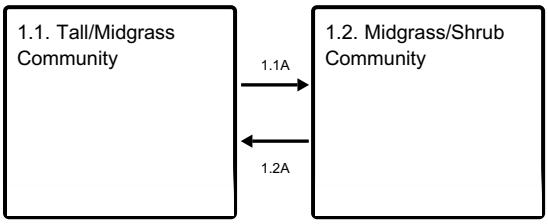
Ecosystem states



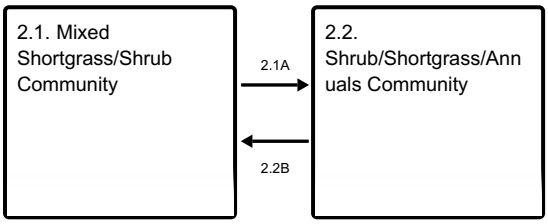
T1A - Absence of disturbance and natural regeneration over time, may be coupled with excessive grazing pressure

R2A - Adequate rest from defoliation and removal of woody canopy, followed by reintroduction of historic disturbance regimes

State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Grassland State

Grassland State - State 1 The Tall/Midgrass Community (1.1) is the interpretive/diagnostic/reference plant community for the Loamy Sand Ecological Site. Sand Shinnery/Havard oak mottes were widely scattered in microsites protected from frequent fire and made up less than ten percent of the plant canopy. Sand sagebrush, broom snakeweed and yucca were also present, but infrequent. Characteristic tall grasses included little and sand bluestems and sand and spike dropseeds. Midgrasses such as sideoats grama, giant dropseed and lower stature grass species like black grama, three-awns, and red lovegrass provided most of the annual production. See the Plant Composition and Annual Production Table below for estimated composition and production of species in the reference/diagnostic community. Common forbs found on the site include prairie coneflower, penstemon, globemallow, croton, stickleaf, sunflower and paperflower. The Midgrass/Shrubs Community (1.2) is the result of the interaction of the reduction in frequency of fires and exacerbated by severe droughts. The reduction in vegetative structure and ground cover resulting from reduced fire frequency allows the shrubs a competitive advantage of a vast and persistent root system and to begin to hoard more site nutrients, processes and space to themselves. Sand Shinnery/Havard oak, honey mesquite, broom snakeweed and sand sagebrush increase in density and cover, varying from 10 to 20 percent canopy cover. Dropseeds, red lovegrass and perennial three-awns begin replacing the more palatable tall and midgrasses found in the reference community. Most forbs such as prairie coneflower, penstemon, globemallow, croton, stickleaf, sunflower and paperflower persist in the Midgrass/Shrubs Community.

Dominant plant species

- sand bluestem (*Andropogon hallii*), grass
- little bluestem (*Schizachyrium scoparium*), grass

Community 1.1
Tall/Midgrass Community

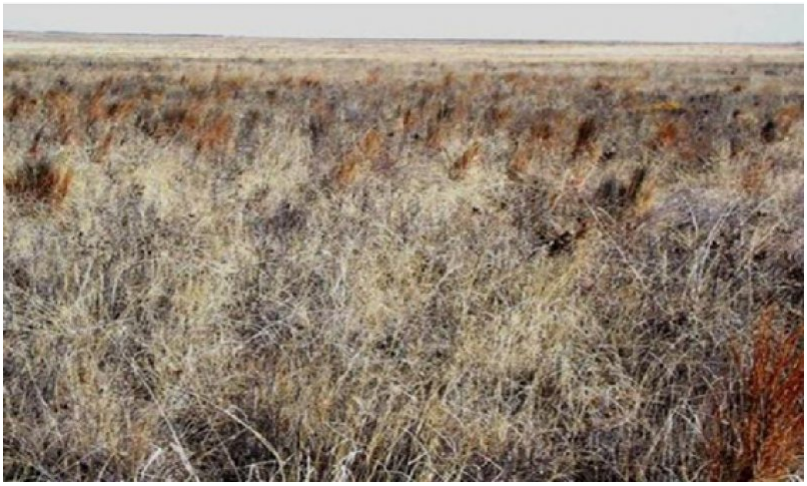


Figure 8. Tall/Midgrass Community

The Tall/Midgrass Community (1.1) is the interpretive plant community for the Loamy Sand Ecological Site. The Tall/Midgrass Community produces from 1,365 to 2,548 pounds of biomass annually, depending upon soil property variation and the amount of precipitation. Severe extended drought conditions could reduce this even further. Grasses produced as much as 85 percent of the annual production. Shrubs are limited in this state by an interaction of the competition from the herbaceous grassland component, recurring fires and periodic droughts. The cover of grasses and mulch aided in the infiltration of rainfall into the moderately permeable soil and reduced runoff. Little runoff occurred and soil-moisture relationships allowed for high vegetative production during good moisture years. The cover of herbaceous plants also moderates soil temperatures and reduces water loss through evaporation. The Tall/Midgrass Community furnishes suitable habitat for grazing wildlife such as bison and pronghorn antelope and in recent times, sheep and cattle. Wild and domestic ungulate herbivory provides a valuable function on this site through accelerated nutrient cycling, mineral cycling, energy flow and removing decadent plant foliar material that limits photosynthetic surface area. This plant type is resilient and recovers well under proper grazing management. However, with continuous inappropriate grazing and the closely linked decrease in frequency of fires and no brush management, this plant community transitions into a Midgrass/Shrubs Community (1.2). The retrogression is reversible with proper grazing management that gives the competitive advantage to the grass component and provides fine fuels for periodic prescribed fires.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	900	1290	1680
Forb	270	392	504
Shrub/Vine	195	280	364
Total	**1365**	**1962**	**2548**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	30-40%
Forb foliar cover	2-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	40-50%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	0%
Bedrock	0%

Water	0%
Bare ground	10-20%

Figure 10. Plant community growth curve (percent production by month). NM4852, R077CY052NM Loamy Sand Reference State. R077CY052NM Loamy Sand Reference State.

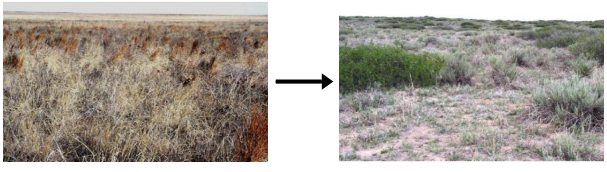
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	2	3	3	5	5	25	30	15	6	6	0

Community 1.2
Midgrass/Shrub Community

Figure 11. Midgrass/Shrub Community

The Midgrass/Shrubs Community (1.2) is the result of the interaction of longer fire return intervals and severe reoccurring droughts. The change in vegetative structure and reduced overall ground cover reduces the competitive advantage of grasses as well as seed production and dispersal. This contributes directly to the lack of accumulation of fine fuels needed for low intensity fire and reduced soil organic matter cycling which reduces soil stability while allowing increases in indigenous shrubs and invasion of shrubs from adjacent sites. The composition of the Midgrass/Shrubs Community (1.2) varies with time and intensity of grazing. Most reference community species are present, but the more palatable species decrease while less palatable species increase. This change is a function of a lack of periodic fire and reoccurring drought that favors shrubs and limits grass competition. Sand Shinnery/Havard oak, honey mesquite, broom snakeweed and sand sagebrush increase in density and cover, varying from 10 to 20 percent canopy cover. Litter and soil organic matter and soil stability are lower than in the reference community. Dropseeds, red lovegrass and perennial three awns begin replacing the more palatable tall and midgrasses found in the reference community. Most reference community forbs such as prairie coneflower, penstemon, globemallow, croton, stickleaf, sunflower and paperflower persist in this community. Annual yields range from 800 to 2,300 pounds. Total herbage production is only slightly reduced, due primarily to loss of vigor, but production by woody species and unpalatable forbs increases as more palatable species percent composition decreases.

Pathway 1.1A
Community 1.1 to 1.2

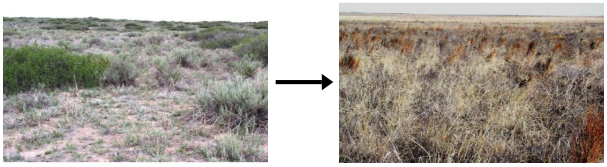


Tall/Midgrass Community **Midgrass/Shrub Community**

With no fire, and brush expansion occurring, the Tall/Midgrass Community will convert into the Midgrass/Shrubs Community. This is a pathway within the reference state natural range of variability. When fire return intervals become longer enabling shrubs to expand and colonize more areas on the site a gradual change toward a more

shrubby appearing landscape characterizes this pathway.

Pathway 1.2A
Community 1.2 to 1.1



Midgrass/Shrub Community | Tall/Midgrass Community

With the implementation of conservation practices such as Prescribed Grazing that fosters litter production and accumulation of fine fuels sufficient in quantity and continuity to carry a fire and/or Brush Management, and Prescribed Burning, the Midgrass/Shrubs Community can be reverted back to the Tall/Midgrass Community. This is a pathway within the reference state natural range of variability. The growth and accumulation of fine fuels and appropriate fire frequency are the principal governors of this pathway.

State 2
Shrubland State

The Mixed Shortgrass/Shrub Community (2.1) supports a 20 to 45 percent woody composition as measured by canopy cover. Honey mesquite, Sand Shinnery/Havard oak, sand sagebrush, broom snakeweed and yucca being the most common shrubs. This plant type is the result of selective grazing by livestock and the differential response of plants to defoliation over a long period of time. There is a continued decline in diversity of the grassland component and an increase in woody species and unpalatable forbs. The Shrub/Shortgrass/Annuals Community (2.2) is the result of many years of inappropriate grazing, lack of periodic fires and little brush management. Sand Shinnery/Havard oak and honey mesquite dominate the Shrub/Shortgrass/Annuals Community, which is essentially a shrubland. Under extreme conditions of grazing and drought, the site deteriorates to active dunes and blowouts. Common understory shrubs are broom snakeweed, yucca and sand sagebrush. With continued inappropriate grazing and no brush control, the shrubs can approach 70 percent or more of the composition of the site as measured by canopy. Short-grasses and low quality annual and perennial forbs occupy woody plant interspaces.

Dominant plant species

- honey mesquite (*Prosopis glandulosa*), shrub
- yucca (*Yucca*), shrub
- sand sagebrush (*Artemisia filifolia*), shrub

Community 2.1
Mixed Shortgrass/Shrub Community

Figure 12. Mixed Shortgrass/Shrub Community

The Mixed Shortgrass/Shrub Community (2.1) supports a 20 to 45 percent woody plant composition as measured by canopy with honey mesquite, Sand Shinnery/Havard oak, sand sagebrush, broom snakeweed and yucca as the

most common shrubs. There is a continued decline in diversity of the grassland component and an increase in woody species and unpalatable forbs. Annual herbage production is reduced due to decline in soil fertility, structure and organic matter, and plant composition has shifted strongly toward the non-grass component. Honey mesquite is a strong increaser throughout the site although it usually does not reach as high a density on this site as on more loamy soils of the MLRA. Remnants of reference community grasses and forbs and unpalatable increasers and invaders occupy the interspaces between shrubs. Cool-season grasses that are adapted to occupy sites exhibiting rapid soil redistribution, such as New Mexico feathergrass, plus other grazing resistant species, can be found under and around woody plants. Because of lowered fertility and competition for nutrients and water from the woody plants the grassland component shows general lack of plant vigor and productivity. Common herbaceous species include three-awns, sand dropseed, broom snakeweed, western ragweed, gaura and sunflowers. Total plant production declines at approximately 600 to 750 pounds per acre, depending on precipitation. Annual production is balanced in favor of woody plants over herbaceous plants. Browsing animals such as goats and deer can find fair food value. Forage quantity and quality for cattle is low and oak bud poisoning can be a livestock problem when access to other forages is limited in the spring. Without aggressive management intervention, the transition toward the Shrub/Shortgrass/Annuals Community (2.2) will continue. The trend cannot be reversed with proper grazing management alone. Accelerated brush management practices along with range planting and grazing management designed to improve plant vigor, litter production and accumulation and improve soil stability and organic matter is required to return this plant community to the grassland state.

Community 2.2
Shrub/Shortgrass/Annuals Community

Figure 13. Shrub/Shortgrass/Annuals Community

The Shrub/Shortgrass/Annuals Community (2.2) is the result of many years of inappropriate grazing, lack of periodic fires and little or no brush management, and drought. Soil moisture is lost through evaporation on bare ground. Sand Shinnery/Havard oak and honey mesquite dominate the Shrub/Shortgrass/Annuals Community, which is essentially a shrubland. Under extreme conditions of inappropriate grazing and drought, the site deteriorates to active dunes and blowouts. Common understory shrubs are broom snakeweed, yucca and sand sagebrush. With continued heavy grazing and no brush management, the shrubs can approach 70 percent or more aerial cover. Short-grasses and low quality annual and perennial forbs occupy the woody plant interspaces. Characteristic grasses are bristlegrass, hairy grama, hooded windmillgrass, sand dropseed and three-awns. Grasses and forbs make up 25 percent or less of the annual herbage production. Forbs commonly found in this community include western ragweed, gaura, silverleaf nightshade, and annuals. The Shrub/Shortgrass/Annuals Community provides cover for wildlife. Only limited preferred forage or browse is available for livestock or wildlife. High cost and high energy accelerating practices are required to restore the Shrub/Shortgrass/Annuals Community (2.2) back to the Reference state if the reference plant community is the management goal. Accelerating practices would include brush management such as aerial herbicide application, range planting, grazing deferment, prescribed grazing and prescribed burning to return the shrubland state to the grassland state.

Pathway 2.1A
Community 2.1 to 2.2

Mixed Shortgrass/Shrub Community

Shrub/Shortgrass/Annuals Community

With Heavy Continuous Grazing pressure, No Fires, and No Brush Management implemented, the Mixed Shortgrass/Shrub Community will transition into the Shrub/Shortgrass/Annuals Community from the Mixed Shortgrass/Shrub Community. The driver is believed to be lack of herbaceous plant production and vigor, lack of litter and fine fuels production and lack of adequate soil organic matter inputs from herbaceous plant roots and tops. This favors increaser shrubs that have mechanisms of resource use and accumulation that are adapted to these conditions. An example of this is honey mesquite. It has deep tap roots and extensive shallow roots that monopolize deep and shallow soil moisture and nutrients. Add to this the ability to self-fertilize thru nitrogen in the leaf litter fall and a clear competitive advantage is apparent.

Pathway 2.2B
Community 2.2 to 2.1

Shrub/Shortgrass/Annuals Community

Mixed Shortgrass/Shrub Community

With Prescribed Grazing and Brush Management conservation practices, the Shrub/Shortgrass/Annuals Community can be shifted to the Mixed Shortgrass/Shrub Community

Transition T1A
State 1 to 2

Heavy Continuous Grazing resulting in continued declines in soil organic matter, soil stability. No Fires and No Brush Management causes the Grassland State (1.) to shift into the Shrubland State (2.). This pathway is outside the reference state natural range of variability and reflects the crossing of a threshold. The mechanism of change is a reduction in herbaceous plant leaf litter and its subsequent decomposition. As grass stems and leafs diminish so does below ground root biomass and soil organic matter. This grass root biomass and associated fungi is critical to glomalin production which is a major contributor to soil stability values and primary productivity.

Restoration pathway R2A
State 2 to 1

The trend cannot be reversed from the Shrubland State (Mixed Shortgrass/Shrub) to the Grassland State with grazing management alone. Accelerated brush management practices along with range planting and prescribed grazing is required to return this plant type to grassland (Midgrass/Shrubs Community).

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	**Sand Bluestem**			430–538	
	sand bluestem	ANHA	*Andropogon hallii*	430–538	–
2	**Giant Dropseed**			65–108	
	giant dropseed	SPGI	*Sporobolus giganteus*	65–108	–
3	**Little Bluestem**			323–430	

3	**Little Bluestem**			323–430	
	little bluestem	SCSC	*Schizachyrium scoparium*	323–430	–
4	**Sideoats Grama**			108–215	
	sideoats grama	BOCU	*Bouteloua curtipendula*	108–215	–
5	**New Mexico Feathergrass**			22–65	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	22–65	–
6	**Black Grama**			43–108	
	black grama	BOER4	*Bouteloua eriopoda*	43–108	–
7	**Threeawn spp.**			43–108	
	threeawn	ARIST	*Aristida*	43–108	–
8	**Red Lovegrass**			108–215	
	red lovegrass	ERSE	*Eragrostis secundiflora*	108–215	–
9	**Sand Dropseed, Spike Dropseed**			108–215	
	spike dropseed	SPCO4	*Sporobolus contractus*	108–215	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	108–215	–
10	**Other Grasses**			65–108	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	65–108	–
19	**Blue Grama**			43–108	
	blue grama	BOGR2	*Bouteloua gracilis*	43–108	–
Forb					
11	**Prairie Coneflower, Globemallow, Penstemon**			108–215	
	beardtongue	PENST	*Penstemon*	108–215	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	108–215	–
	globemallow	SPHAE	*Sphaeralcea*	108–215	–
12	**Stickleaf, Coton, Mustard spp., Paperflower**			108–215	
	mustard	BRASS2	*Brassica*	108–215	–
	croton	CROTO	*Croton*	108–215	–
	Adonis blazingstar	MEMU3	*Mentzelia multiflora*	108–215	–
	whitestem paperflower	PSCO2	*Psilostrophe cooperi*	108–215	–
13	**Wesrern Ragweed, Wooly Beeblossom**			65–108	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	65–108	–
14	**Annual Wild Buckwheat, Annual Sunflwr, Other Forbs**			108–215	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	108–215	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	108–215	–
	common sunflower	HEAN3	*Helianthus annuus*	108–215	–
Shrub/Vine					
15	**Small Soapweed Yucca**			22–108	
	soapweed yucca	YUGL	*Yucca glauca*	22–108	–
16	**Sand Sagebrush, Shinnery Oak**			0–323	
	sand sagebrush	ARFI2	*Artemisia filifolia*	0–323	–
	Havard oak	QUHA3	*Quercus havardii*	0–323	–
17	**Broom Snakeweed**			22–108	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	22–108	–
18	**Other Shrubs**			0–108	

18	**Other Shrubs**			0–108	
	Shrub, deciduous	2SD	*Shrub, deciduous*	0–108	–

Animal community

Habitat for Wildlife:

Many types of grassland insects, reptiles, birds and mammals used the reference/diagnostic plant community of the Loamy Sand Ecological Site, either as their base habitat or from the adjacent sites. Mule deer, white-tailed deer, pronghorn antelope and collared peccary characterize the site. Many species of lagomorphs and rodents occupy the site. Predators include coyote, swift fox, badger, bobcat and occasionally mountain lion. Lesser prairie chicken, scaled quail, songbirds, and birds of prey were indigenous or frequent users of this site for at least a portion of their habitat needs. Deer and quail particularly favor the habitat provided by the Midgrass/Shrubs Community (1.2) and Mixed Shortgrass/Shrub Community (2.1). The Lesser Prairie Chicken (LPC) prefers an open grassland presented by the Tall/Midgrass (1.1) or Midgrass/Shrub (1.2) Communities for nesting and brood rearing. This site also provides habitats which, support a resident animal community that is characterized by desert cottontail, spotted ground squirrel, plains pocket gopher, hispid pocket mouse, Ord's kangaroo rat, northern grasshopper mouse, southern plains woodrat, ferruginous hawk, roadrunner, meadowlark, plains spadefoot toad, western box turtle, lesser earless lizard, southern prairie lizard, round-tailed horned lizard, bullsnake, plains black-headed snake and western diamondback rattlesnake. Where large woody plants are present, scissor-tailed fly catcher, mourning dove, white-necked raven, mockingbird, western kingbird, loggerhead shrike and Swainson's hawk nest. Where associated with farmland, lesser sandhill crane and long-billed curlew feed during migration. Bobwhite quail are sometimes associated with native plum thickets. Grasshopper and vesper sparrows utilize the site during fall migration. The marsh hawk hunts over the site during the cooler months.
The reference states are suited to primary grass eaters such as bison and cattle. As change occurs, and woody plants expand and dominate site functions, it becomes better habitat for sheep, goats, deer and similar wildlife because of the browse and cover (both thermal and hiding). Predators make sheep and goat production problematic unless a predator management system is employed. Livestock should be stocked in proportion to the available grass, forb and browse forage, keeping deer competition for forbs and browse in mind. If the animal numbers are not kept in balance with herbage and browse production through grazing management and wildlife population management, the late Shrub/Shortgrass/Annuals Community (2.2) will have little to offer as habitat except cover and mast.

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
Arch----------B
Brownfield----------A
Jalmar----------A
Portales----------B
Triomas----------B

Recreational uses

This site offers recreation potential for hiking, horseback riding, nature observation and photography. There is also potential for quail, dove, antelope and predator hunting.
During years of abundant spring moisture, this site displays wildflowers in a wide spectrum of colors from May through August. A few fall blooming flowers also occur. If moisture is confined to the summer rainy period, only the view of a virtual "sea of grass" portrayed by waves of head-high sand bluestem will be rewarding to those who appreciate a tall grass prairie.

Wood products

The natural plant community of this site affords little or no wood products.

Other products

Grazing:

This site is suitable for grazing during all seasons of the year. It is most suitable for grazing by mature cattle due to the high composition of tall grasses and other coarse forage and browse. Sheep do not do well on this site. If protection from, or control of, predators can be provided, it would also be suitable for minor proportions of goats. Grazing by goats would also be of value
from a brush control standpoint where woody plants have increased considerably or invaded. In general, cattle grazing will result in a decrease of grasses and an increase in unpalatable forbs and woody plants. Continuous yearlong grazing or grazing continually during the potential growing season will result in a decrease in the vigor and abundance of sand bluestem, little bluestem, sideoats grama and black grama. A corresponding increase will occur in threeawn spp., dropseed spp., shinnery oak, sand sagebrush and yucca. Eventually, mesquite will invade
and brushy species and greater areas of bare exposed soil will dominate the site. Well-planned systems of deferred grazing by domestic livestock, which vary the seasons of grazing and rest in pastures during successive years, will result in a balanced plant community providing highquality forage and browse during all seasons of the year.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index ----------Ac/AUM
100 - 76----------2.1 – 3.0
75 – 51----------2.9 – 4.4
50 – 26----------4.5 – 8.0
25 – 0----------10.5+

Inventory data references

NRCS FOTG – Section II of the FOTG Range Site Descriptions and numerous historical accounts of vegetative conditions at the time of
early settlement in the area were used in the development of this site description. Vegetative inventories were made at several site locations
for support documentation.
Inventory Data References (documents):
NRCS FOTG – Section II - Range Site Descriptions

Type locality

Location 1: Chaves County, NM
Location 2: Curry County, NM
Location 3: De Baca County, NM
Location 4: Lea County, NM
Location 5: Roosevelt County, NM

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Approval

Bryan Christensen, 9/11/2023

Acknowledgments

Site Development and Testing Plan

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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	06/30/2024
Approved by	Bryan Christensen
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):**

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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:**
