USDA Natural Resources
Conservation Service

Ecological site R069XY006CO
Loamy Plains

Last updated: 3/11/2025
Accessed: 05/11/2025

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.

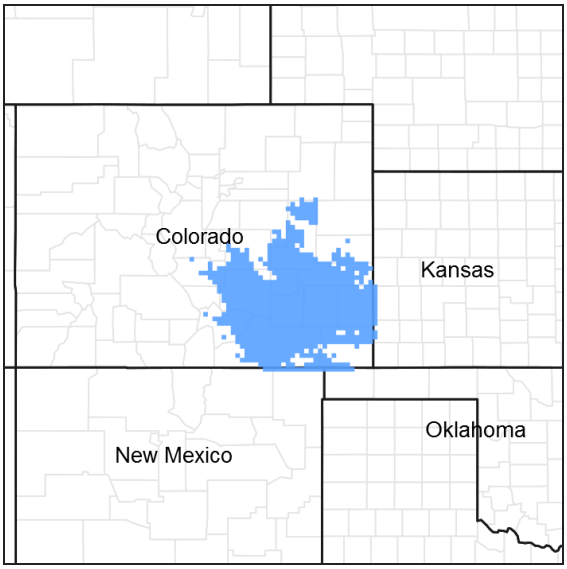


Figure 1. Mapped extent

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.

MLRA notes

Major Land Resource Area (MLRA): 069X–Upper Arkansas Valley Rolling Plains

MLRA 69 is in the Arkansas Watershed of southeastern (SE) Colorado. It consists of rolling plains, river valleys, and canyonlands. The Arkansas River flows from the Rocky Mountains to Kansas. Tributaries include the Huerfano and Purgatoire Rivers. The MLRA is traversed by Interstate 25 and U.S. Highway 50, and includes the cities of Pueblo, La Junta, and Lamar. Other cities include Cañon City, and Walsenburg. Bent's Fort was once a major trading post along the Santa Fe Trail. The majority of land use is rangeland (less than 75 percent), and 6 percent cropland. The remainder is urban, recreation, etc. Land ownership is mostly private. Federal lands include U.S. Forest Service Comanche National Grassland, Department of Defense Piñon Canyon Maneuver Site and Fort Carson. There is a minor amount of Bureau of Land Management and other federal land. State areas include Pueblo and John Martin reservoirs. Elevations MLRA-wide are 3,700 to 6,400 feet.

The "Dust Bowl" region (1930s) included SE Colorado, which is periodically affected by severe drought. Dust storms may form during drought years, in windy periods. Annual precipitation is 10 to 16 inches. Precipitation occurs mostly during the growing season, often during rapidly developing thunderstorms. Mean annual air temperature (MAAT) is 48 to 52 degrees Fahrenheit. Summer temperatures may exceed 100 degrees Fahrenheit. Evapotranspiration rates are high. Winter temperatures may be subzero. Snowfall varies from 20 to 40 inches per year. Blizzards can form quickly.

LRU notes

LRU A (10 to 12 inches PZ) is the central portion of MLRA 69, extent is 2.4 million acres. There is irrigated cropland in the Arkansas Valley. Precipitation is too limited for dryland crops. Most of LRU A is rangeland, and includes the Comanche National Grassland (FS). This LRU is found in portions of Bent, Crowley, Otero and Pueblo counties. Soil Moisture Regime is Ustic Aridic. The Mean Annual Air Temperature (MAAT) is 51 to 54 degrees Fahrenheit.

LRU B (12 to 14 inches PZ) is 4.7 million acres and includes portions of Baca, Bent, Crowley, El Paso, Fremont, Kiowa, Las Animas, Lincoln, Prowers, and Pueblo counties. Most of the LRU is in rangeland. Land uses include irrigated and dry cropland, small acreage and urban ownership. Land east of Interstate 25 remains largely agricultural. Canyonlands are in the southern half and include Piñon Canyon Maneuver Site and the Picket Wire Canyon of the Comanche National Grasslands. The soil moisture regime is Ustic Aridic and the MAAT is 50 to 54 degrees Fahrenheit.

Classification relationships

MLRA 69 is in the Piedmont and Raton Sections of the Great Plains Province. The MLRA is further defined by Land Resource Units (LRUs) A, B, and C. The modal concepts of each LRU can be defined by soil properties and annual precipitation zones (PZ). Other features, such as climate, geology, landforms, and key vegetation, further refine these concepts and are described in the Ecological Site Description (ESD).

LRU A (10 to 12 inches PZ) is 2.4 million acres in the central portion of MLRA 69. There is irrigated cropland in the Arkansas Valley. Precipitation is too limited for dryland crops. Most of LRU A is rangeland, and includes the Comanche National Grassland (FS). This LRU is in portions of Bent, Crowley, Otero, and Pueblo counties. Soil Moisture Regime is Ustic Aridic. The Mean Annual Air Temperature (MAAT) is 51 to 54 degrees Fahrenheit.

LRU B (12 to 14 inches PZ) is 4.7 million acres and includes portions of Baca, Bent, Crowley, El Paso, Fremont, Kiowa, Las Animas, Lincoln, Prowers, and Pueblo counties. Most of the LRU is in rangeland. Land uses include irrigated and dry cropland, small acreage and urban ownership. Land east of Interstate 25 remains largely agricultural. Canyonlands are in the southern half and include Piñon Canyon Maneuver Site and the Picket Wire Canyon of the Comanche National Grasslands. Soil moisture regime is Ustic Aridic. The mean annual air temperature is 50 to 54 degrees Fahrenheit.

The Loamy Plains Ecological Site, LRUs A and B, was developed from an earlier version of the Ecological Site (2004, 2007). This earlier version of the Loamy Plains Ecological Site (2004) was based on input from Natural Resources Conservation Service (formerly Soil Conservation Service) and historical information obtained from the Loamy Plains Rangel Site descriptions (1975, revised 1983). This ESD meets the Approved requirements of the National Ecological Site Handbook (NESH). This ESD will continue refinement according to the NESH.

Ecological site concept

The Loamy Plains ecological site occupies a run-off position on the landscape on slopes of less than 10 percent. The soil depth is greater than 20 inches to bedrock and the site may have calcium carbonate but no other salts. The clay content in the particle size control section ranges from 18 to 35 percent clay.

Associated sites

R069XY058CO	**Limestone Breaks** Limestone Breaks Ecological Site is commonly adjacent to and higher on the landscape than Loamy Plains Ecological Site.
R069XY053CO	**Sandstone Breaks** Sandstone Breaks Ecological Site is commonly adjacent to and higher on the landscape than Loamy Plains Ecological Site .
R069XY026CO	**Sandy Plains** Sandy Plains Ecological Site is commonly adjacent to Loamy Plains Ecological Site on the landscape.

Similar sites

R069XY042CO	**Clayey Plains** Clayey Plains Ecological Site has a silty clay, clay loam, or silty clay loam surface texture and greater than 35 percent clay in the particle control section.
R069XY026CO	**Sandy Plains** Sandy Plains Ecological Site has a sandy loam or loamy sand surface texture.

Table 1. Dominant plant species

Tree	(1) *Juniperus monosperma*
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia*
Herbaceous	(1) *Bouteloua gracilis* (2) *Pleuraphis jamesii*

Physiographic features

This site occurs on nearly level to gently sloping plains.

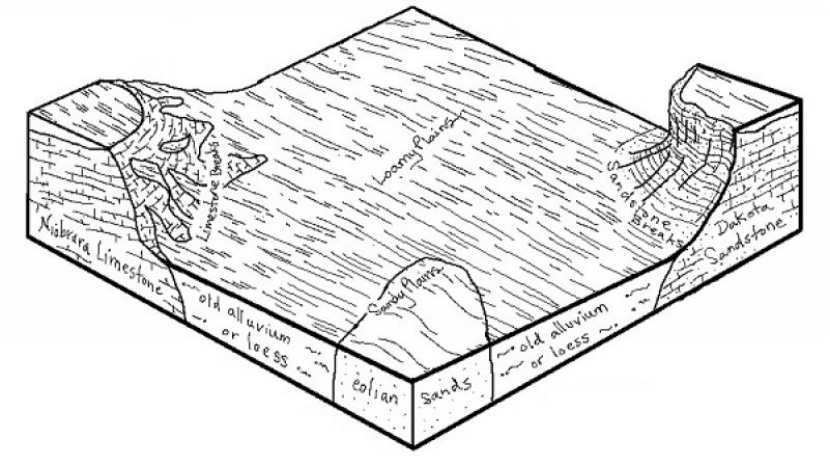


Figure 2. Loamy Plains, LRUs A & B Block Diagram

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Fan (3) Terrace
Runoff class	Very low to medium
Flooding frequency	None
Ponding frequency	None
Elevation	1,219–1,646 m
Slope	0–10%
Ponding depth	0 cm
Water table depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Approximately 75 percent of the annual precipitation occurs during the growing season from mid-April to late September. Snowfall can vary greatly from year to year and can range from 20 to 40 inches per year. Winds are estimated to average 6 to 7 miles per hour annually. Daytime winds are generally stronger than nighttime winds. Occasional strong storms may bring brief periods of high winds with gusts to more than 60 miles per hour. The

average length of the freeze-free period (28 °F) is 168 days. The average last freeze in the spring is April 22nd, and the average date of first freeze in fall is October 7th. The average length of the frost-free period (32 °F) is 149 days. The last frost in the spring is May 5th, and the average date for first frost in the fall (32 °F), is October 1. July is the hottest month, and January is the coldest. It is not uncommon for temperature to exceed 100 °F during the summer. Summer humidity is low and evaporation is high. The winters are characterized with frequent northerly winds, producing severe cold and temperatures dropping to -30 °Fahrenheit.

LRU A, in the Arkansas River Valley, is the hottest and driest portion of the MLRA. Mean Annual Precipitation (MAP) is 10 to 12 inches, and Mean Annual Air Temperature (MAAT) is 51 to 54 °Fahrenheit. LRU B is the largest extent. MAP is 12 to 14 inches, and MAAT is 50 to 54 °Fahrenheit.

Table 3. Representative climatic features

Frost-free period (characteristic range)	127-135 days
Freeze-free period (characteristic range)	149-164 days
Precipitation total (characteristic range)	305-381 mm
Frost-free period (actual range)	122-141 days
Freeze-free period (actual range)	143-175 days
Precipitation total (actual range)	279-381 mm
Frost-free period (average)	131 days
Freeze-free period (average)	157 days
Precipitation total (average)	330 mm

Climate stations used

- (1) EADS [USC00052446], Eads, CO
- (2) PUEBLO RSVR [USC00056765], Pueblo, CO
- (3) LA JUNTA MUNI AP [USW00023067], La Junta, CO
- (4) LA JUNTA 20 S [USC00054726], La Junta, CO
- (5) TACONY 13 SE [USC00058157], Boone, CO
- (6) CHERAW 1 N [USC00051539], La Junta, CO
- (7) ORDWAY 21 N [USC00056136], Ordway, CO
- (8) ROCKY FORD 2 SE [USC00057167], Rocky Ford, CO
- (9) TIMPAS 13 SW [USC00058290], Model, CO
- (10) PUEBLO MEM AP [USW00093058], Pueblo, CO
- (11) LA JUNTA [USC00054724], La Junta, CO
- (12) ORDWAY 2 ENE [USC00056131], Ordway, CO

Influencing water features

There are no water features associated with this site.

Wetland description

N/A

Soil features

The soils of this site are moderately deep, deep, and very deep. They are moderately well drained or well drained with moderate or moderately slow permeability. They formed on interfluves, fan remnants, terraces, ridges, hillslopes, and pediments. The surface layer thickness ranges from 4 to 10 inches thick. The soil moisture regime is ustic aridic. The soil temperature regime is mesic. Soils in LRUs A and B are mostly Aridisols. Soils in LRU C are mostly Alfisols. Commonly the calcium carbonate equivalent (CCE) for the B horizons for soils in MLRA 69 ranges from 5 to 30 percent. Most of the soils in LRU A and B have a calcic horizon (CCE equal to or greater than 15

percent).

Major soil series correlated to this ecological site include Almagre, Bacid, Fort, Kim, Kimera, Manvel, Minnequa, Villedry, and Wilid. There are other soil series correlated to Loamy Plains Ecological Site, but they have been converted to cropland or may be obsolete.

Types of parent material include old alluvium, eolian deposits, loess, slope alluvium, slope alluvium over residuum weathered from limestone and shale, and loess over residuum weathered from sandstone. Parent material origin is from mixed sources.

The attributes listed below represent 0 to 40 inches in depth or to the first restrictive layer.

Revisions to soil surveys are ongoing. For the most recent updates, visit the Web Soil Survey, the official site for soils information: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Eolian deposits (3) Loess (4) Slope alluvium
Surface texture	(1) Loam (2) Silt loam (3) Silty clay loam (4) Clay loam (5) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	51–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16–22.86 cm
Calcium carbonate equivalent (0-101.6cm)	0–40%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–10
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–3%

Ecological dynamics

The information in this ESD, including the state-and-transition model (STM), was developed using archeological and historical data, professional experience, and scientific studies. The information is representative of a complex set of plant communities. The plant composition has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal-use pastures, short-duration or time-controlled grazing strategies, and historical accounts.

Not all scenarios or plants are included. Key indicator plants, animals, and ecological processes are described to inform land management decisions.

This region was historically occupied by large grazing animals, such as bison, along with pronghorn and mule deer. Deer and pronghorn are widely distributed throughout the MLRA. This is an important site for livestock grazing, especially cattle.

Drought has historically impacted the vegetation of this region. Changes in species composition vary depending upon the duration and severity of the drought cycle and prior grazing management. Recent drought events have increased mortality of blue grama significantly in some locales, along with other bunchgrasses, such as sand bluestem, little bluestem, needle and thread, Fendler threeawn, and squirreltail. Historic fire frequency (pre-industrial) is estimated at 15 to 20 years (Guyette, 2012), randomly distributed, and started by lightning at various times throughout the growing season. Early human inhabitants were also likely to start fires (deliberate or accidental).

Southeastern Colorado was strongly affected by extended drought conditions in the “Dust Bowl” period of the 1930s, with recurrent drought cycles in the 1950s and 1970s. Extreme to exceptional drought conditions have re-visited the area from 2002 to 2012, with brief interludes of near normal to normal precipitation years. “During periods of drought, high winds give rise to the dust storms which are especially characteristic of the southeastern plains (WRCC, 2022).” Recent drought events have increased mortality of blue grama upwards of 80 percent in some locales. The long-term effects of these latest drought years have yet to be determined.

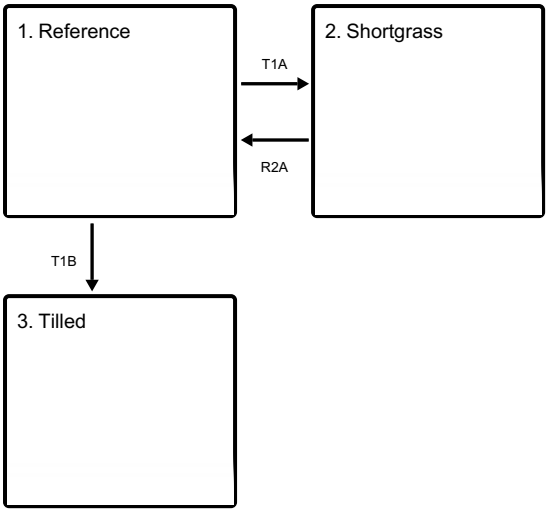
Growth of native cool-season plants begins about April 15 and continues to mid-June. Native warm-season plants begin growth about May 1 and continue to about August 15. Regrowth of cool-season plants occurs in September and October in most years, depending on moisture. For detailed information, visit the Western Regional Climate Center website at https://wrcc.dri.edu/.

Continuous grazing by large herbivores without adequate recovery periods following each grazing event causes blue grama, buffalograss, galleta, and broom snakeweed to increase. Blue grama and buffalograss may eventually form a sod. Cool-season grasses such as western wheatgrass and green needlegrass decrease in frequency and production. This also happens with key shrubs such as fourwing saltbush and winterfat. American vetch and other highly palatable forbs decrease. Red threeawn, annuals, and bare ground increases under heavy, continuous grazing, excessive defoliation, or long-term non-use. Much of this ecological site has been tilled and used for crop production, especially in irrigated areas along the Arkansas River. Other sites have been converted to suburban residence and small acreages, especially near the larger communities.

Drier and warmer climatic conditions exist in the central portion of MLRA 69. This area includes the eastern half of Pueblo county, northern Otero, extreme northwestern Bent, western edge of Kiowa, southern edge of Lincoln and all of Crowley County. These conditions are primarily caused by a rain shadow effect from the southern Rocky Mountains. Evapotranspiration rates (atmospheric demand) are higher in this area of MLRA 69. Total annual production is typically lower.

State and transition model

Ecosystem states

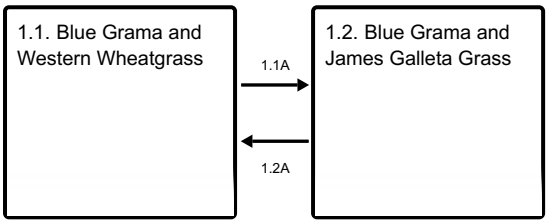


T1A - Long-term heavy grazing without adequate recovery period. Interruption of the natural fire regime.

T1B - Native rangeland is plowed to convert it to cropland use and abandoned.

R2A - Prescribed grazing. Appropriately timed prescribed fire.

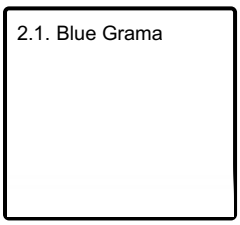
State 1 submodel, plant communities



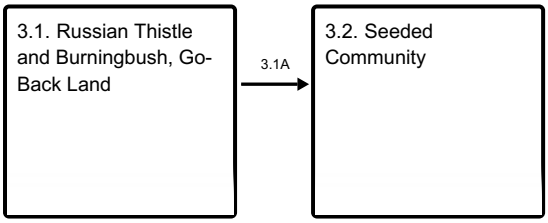
1.1A - Heavy season-long grazing. Reduced fire frequency.

1.2A - Long-term prescribed grazing. Appropriately timed prescribed fire.

State 2 submodel, plant communities



State 3 submodel, plant communities



3.1A - Range planting.

MLRA 69A and B

I. This is a run-on site.

A. This site is influenced by salts.

1 This site has a water table (redoximorphic features present). Salt Meadow (R069XY030CO).

2 This site is a closed depression.

i. This site is influenced by calcium carbonate and other salts. Saline Plains Swale (R069XY012CO).

ii. This site is only influenced by calcium carbonate. Plains Swale (R069XY011CO).

3 This site has a loamy sand surface texture. Sandy Salt Flats (R069XY032CO).

4 This site has sodium (usually has slick spots and a pH of 9) and calcium carbonate. Salt Flat (R069XY033CO).

5 This site has other salts. Saline Overflow (R069XY037CO).

B. This site is on flood plains and flood-plain steps. Sandy Bottomland (R069XY031CO).

C. This site is in river channels. Riverbottom (R069XY073CO) DRAFT.

II. This is a run-off/upland site.

A. This site has steep slopes (10-45%).

1 This site has a soil depth of shallow or very shallow (I<20").

i. The bedrock is sandstone. Sandstone Breaks (R069XY053CO).

ii. The bedrock is limestone. Limestone Breaks (R069XY58CO).

iii. The bedrock is shale. Shale Breaks (R069XY048CO).

iv. The bedrock is gypsum. Gypsum Breaks (R069XY080CO).

B. The slope is <10%.

1 The soil depth is shallow (<20") to shale bedrock. Shaly Plains (R069XY046CO).

2 This site has calcium carbonate and other salts. Alkaline Plains (R069XY047CO).

3 This site has only calcium carbonate (no other salts).

i. This site has a sandy loam or loamy sand surface texture. Sandy Plains (R069XY026CO).

ii. This site has a loam, silt loam, clay loam, or silty clay loam surface texture and 18-35% clay in the particle size control section. Loamy Plains (R069XY006CO).

iii. This site has a silty clay, clay loam, or silty clay loam surface texture and >35% clay in the particle size control section. Clayey Plains (R069XY042CO).

State 1
Reference

The Reference State contains two community phases. These phases have been historically maintained by fire every14-20 years (Guyette, Richard P., and others. 2012), and herbivory with adequate recovery periods. High production of perennial grasses and extensive cover allow for increased soil moisture retention, vegetative production, and overall soil quality.

Dominant plant species

- oneseed juniper (*Juniperus monosperma*), tree
- fourwing saltbush (*Atriplex canescens*), shrub
- winterfat (*Krascheninnikovia lanata*), shrub
- blue grama (*Bouteloua gracilis*), grass
- James' galleta (*Pleuraphis jamesii*), grass

Community 1.1

Blue Grama and Western Wheatgrass

Figure 9. Reference Plant Community, Huerfano County

This is the interpretive plant community. This plant community evolved with grazing by large herbivores, is well suited for grazing by domestic livestock and is in areas that are properly managed with prescribed grazing that allows for adequate recovery periods following each grazing event. The potential vegetation is about 75-90 percent grasses and grass-like plants, 5-15 percent forbs and 5-10 percent woody plants. The major grasses include grama, western wheatgrass, and galleta. Sub-dominant grasses and grass-likes include buffalograss, sand dropseed, squirreltail, sideoats grama, and sun sedge. Major forbs and shrubs include scarlet globemallow, dotted gayfeather, American vetch, purple prairie clover, fourwing saltbush, and winterfat. This plant community is well adapted to the Northern Great Plains climatic conditions and is resistant to many disturbances, except continuous grazing, plowing, uncontrolled fire events, and urban as well as other land use development. The diversity in plant species allows for high drought tolerance. Plant litter is properly distributed with very little movement off-site. Natural plant mortality is very low. This is a sustainable plant community in terms of soil stability, watershed function, and biologic integrity. Total annual production ranges from 500 to 1600 pounds of air-dry vegetation per acre across LRUs A & B and will average 1100 pounds during an average year.

Dominant plant species

- oneseed juniper (*Juniperus monosperma*), tree
- fourwing saltbush (*Atriplex canescens*), shrub
- winterfat (*Krascheninnikovia lanata*), shrub
- blue grama (*Bouteloua gracilis*), grass
- western wheatgrass (*Pascopyrum smithii*), grass
- scarlet globemallow (*Sphaeralcea coccinea*), other herbaceous
- American vetch (*Vicia americana*), other herbaceous

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	476	1048	1524
Forb	50	111	161
Shrub/Vine	28	62	90
Tree	6	12	18
Total	**560**	**1233**	**1793**

Figure 11. Plant community growth curve (percent production by month). CO6901, Warm-season/cool-season co-dominant; MLRA-69; upland fine textured soils..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	30	20	10	3	2	0	0

Community 1.2
Blue Grama and James Galleta Grass

Figure 12. Bouteloua gracilis-Pleuraphis jamesii (blue grama-James galleta grass)

Species such as western wheatgrass, purple prairie clover, fourwing saltbush, and winterfat have been reduced. Blue grama, buffalograss (LRU B), and galleta dominate the community. Blue grama and buffalograss will begin to exhibit a sodded appearance under higher moisture regimes. Ring muhly, sand dropseed, red threeawn, sixweeks fescue, bottlebrush squirreltail, plains pricklypear, hairy goldaster, fringed sagebrus, and broom snakeweed have increased. This plant community is at risk of losing western wheatgrass, fourwing saltbush, winterfat, and purple prairie clover. Silky sophora, scarlet globemallow, and blanketflower may increase. Total above ground carbon has been reduced due to decreases in forage and litter production. Reduction of rhizomatous wheatgrass, nitrogen fixing forbs, shrub component, and increased warm-season shortgrasses has begun to alter the biotic integrity of this community. Water and nutrient cycles may be impaired. Total annual production can vary from 400 to 1200 pounds of air-dry vegetation per acre and averages 900 pounds per year.

Dominant plant species

- oneseed juniper (*Juniperus monosperma*), tree
- fourwing saltbush (*Atriplex canescens*), shrub
- winterfat (*Krascheninnikovia lanata*), shrub
- blue grama (*Bouteloua gracilis*), grass
- James' galleta (*Pleuraphis jamesii*), grass

Figure 13. Plant community growth curve (percent production by month). CO6903, Warm-season dominant, cool-season sub-dominant; MLRA-69; upland fine textured soils..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	35	25	15	5	0	0	0

Pathway 1.1A
Community 1.1 to 1.2

Blue Grama and Western Wheatgrass

Blue Grama and James Galleta Grass

Recurring heavy, season-long herbivory, extended drought, and reduced fire frequency shift this plant community toward Community 1.2.

Pathway 1.2A

Community 1.2 to 1.1

Blue Grama and James Galleta Grass

Blue Grama and Western Wheatgrass

Long-term prescribed grazing with adequate recovery periods between each grazing event, and restoration of the fire regime can convert this plant community back to the Reference Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Shortgrass

This state evolved under long-term heavy grazing pressure without adequate recovery. This is a very stable state, resistant to change due to the high tolerance of blue grama and buffalograss to grazing, the development of a shallow root system, and subsequent changes in hydrology and nutrient cycling. The loss of other functional/structural groups such as warm-season bunchgrasses, cool-season bunchgrasses, forbs, and shrubs, reduces the biodiversity productivity of this site.

Dominant plant species

- oneseed juniper (*Juniperus monosperma*), tree
- broom snakeweed (*Gutierrezia sarothrae*), shrub
- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Community 2.1
Blue Grama

Figure 14. Bouteloua gracilis (blue grama) Community.

In this plant community, galleta has been reduced. Green needlegrass, American vetch, purple prairie clover, fourwing saltbush, and winterfat have been removed. Western wheatgrass may persist in trace amounts in protected areas, small depressions, and higher precipitation regimes within the MLRA. Blue grama and buffalograss dominate the community and can form a “sodbound” appearance. Purple threeawn, sand dropseed, tumblegrass, bottlebrush squirrletail, sixweeks fescue, plains pricklypear, and hairy goldaster all increase in varying amounts. In some instances, broom snakeweed may significantly increase. This plant community is resistant to change due to grazing tolerance of buffalograss and blue grama. A significant amount of production and diversity has been lost

when compared to the Reference Community. Loss of cool-season grasses, fourwing saltbush, winterfat, and nitrogen fixing forbs has negatively impacted energy flow and nutrient cycling. Water infiltration is significantly reduced due to the massive shallow root system characteristic of sod bound blue grama and buffalograss. Soil loss may be obvious where flow paths are connected. Total annual production ranges from 200 to 900 pounds of air-dry vegetation per acre per year and averages 600 pounds.

Dominant plant species

- oneseed juniper (*Juniperus monosperma*), tree
- broom snakeweed (*Gutierrezia sarothrae*), shrub
- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Figure 15. Plant community growth curve (percent production by month). CO6904, Warm-season dominant; MLRA-69; upland fine textured soils..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	15	45	25	15	0	0	0	0

State 3
Tilled

The Tilled State has two community phases. This state is created when a tillage operation such as plowing, chiseling, and/or discing has been implemented on native grassland to convert it to cropland use. Historically, this state was largely created during the early 1900's in the southern Great Plains region. Large tracts were plowed and planted to dryland wheat or other dryland crops. The subsequent Dust Bowl era of the 1930's, coupled with the Great Depression caused much of this plowed ground to be abandoned. Today, some of this land is referred to as "go-back", and is re-vegetating through autogenic processes. Other land has been re-seeded to native or introduced species. While there is a large component of "go-back" resulting from the early 1900's, it also includes any cropland that is no longer in production and idled.

Community 3.1
Russian Thistle and Burningbush, Go-Back Land

Figure 16. Go-back Community

Figure 17. Go-back Community, Landscape Appearance

Go-back land develops when the soil is tilled or farmed (sodbusted) and abandoned. All of the native plants are removed, soil organic mater is reduced, soil structure is altered, and a plowpan or compacted layer is formed. Residual synthetic chemicals often remain from past farming operations and erosion processes may be active. Go-back land evolves through several plant communities beginning with an early annual plant community, which initiates the revegetation process. Plants such as Russian thistle, burningbush, and other annuals begin to establish. These plants give some protection from erosion and start to build minor levels of soil organic matter. This early annual plant community lasts for two to several years. Purple threeawn, sand dropseed, and several other early perennials can dominate the plant community for five to eight years or more. Buffalograss establishes next and dominates for many years. Eventually western wheatgrass, blue grama, and other natives become reestablished. Broom snakeweed can be a major component on some go-back areas. Invasive and noxious plants such as field bindweed and cheatgrass can become established on some go-back fields.

Dominant plant species

- Russian thistle (*Salsola*), other herbaceous
- burningbush (*Bassia scoparia*), other herbaceous

Community 3.2
Seeded Community

Rangeland Seeding on go-back land or recently cropped land for the purpose of converting it to permanent vegetative cover creates this community. Plant species indigenous to the site are used throughout the MLRA due to their suitability to the semi-arid climate. Indigenous species are most adapted to site conditions and therefore can be sustained in the MLRA. Improved cultivars of plant species are typically used to enhance seedling establishment and meet specific reclamation resource objectives.

Pathway 3.1A
Community 3.1 to 3.2

Range planting with plants species indigenous to the site followed with prescribed grazing can be used to convert Go-back Land to Seeded Rangeland, which can resemble the Reference Community.

Conservation practices

Range Planting

Transition T1A
State 1 to 2

Long-term heavy grazing without adequate recovery period drives the Reference State to the Shortgrass Dominated State. The interruption of the natural fire regime accelerates this process.

Transition T1B
State 1 to 3

The Tilled State is created when native rangeland is plowed to convert it to cropland use, and subsequently idled or abandoned.

Restoration pathway R2A
State 2 to 1

Applying the appropriate prescribed grazing system along with appropriately timed prescribed burning will convert State 2 back to the Reference State.

Conservation practices

Prescribed Burning
Prescribed Grazing

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm Season Shortgrass**			364–841	
	blue grama	BOGR2	*Bouteloua gracilis*	336–673	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	6–106	–
	buffalograss	BODA2	*Bouteloua dactyloides*	22–56	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	0–6	–
2	**Warm Season Mid-grass**			84–230	
	James' galleta	PLJA	*Pleuraphis jamesii*	56–112	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	17–67	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	6–39	–
	purple threeawn	ARPU9	*Aristida purpurea*	6–11	–
3	**Cool Season Mid-grass**			67–230	
	western wheatgrass	PASM	*Pascopyrum smithii*	56–179	–
	green needlegrass	NAVI4	*Nassella viridula*	6–34	–
	squirreltail	ELEL5	*Elymus elymoides*	6–17	–
4	**Cool Season Annual Grass**			0–17	

	little barley	HOPU	*Hordeum pusillum*	0–11	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–6	–
5	**Sedge**			0–11	
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0–11	–
6	**Other Native Grasses**			11–34	
Forb					
7				11–168	
	dotted blazing star	LIPU	*Liatris punctata*	11–22	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–11	–
	lacy tansyaster	MAPIP4	*Machaeranthera pinnatifida ssp. pinnatifida var. pinnatifida*	0–11	–
	Colorado four o'clock	MIMU	*Mirabilis multiflora*	0–11	–
	crownleaf evening primrose	OECO2	*Oenothera coronopifolia*	0–11	–
	oppositeleaf bahia	PIOP	*Picradeniopsis oppositifolia*	0–11	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–11	–
	stiff greenthread	THFI	*Thelesperma filifolium*	0–11	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–11	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–11	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–11	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–11	–
	Indian blanket	GAPUP2	*Gaillardia pulchella var. pulchella*	0–11	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–6	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–6	–
8	**Cool Season Forb**			11–39	
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	11–17	–
	New Mexico groundsel	PANEM	*Packera neomexicana var. mutabilis*	0–11	–
	broadbeard beardtongue	PEAN4	*Penstemon angustifolius*	0–11	–
9	**Legumes**			22–90	
	American vetch	VIAM	*Vicia americana*	11–22	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	6–17	–
	purple prairie clover	DAPUP	*Dalea purpurea var. purpurea*	6–17	–
	white locoweed	OXSE	*Oxytropis sericea*	0–11	–
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–11	–
	silky sophora	SONU	*Sophora nuttalliana*	0–11	–
10	**Annuals**			0–22	
	common sunflower	HEAN3	*Helianthus annuus*	0–11	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–6	–
	Texas croton	CRTE4	*Croton texensis*	0–6	–
11	**Other Native Forbs**			11–34	
Shrub/Vine					
12	**Half-shrubs**			6–62	

	winterfat	KRLA2	*Krascheninnikovia lanata*	6–34	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–22	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–6	–
13	**Shrubs**			11–135	
	fourwing saltbush	ATCA2	*Atriplex canescens*	11–67	–
	tree cholla	CYIM2	*Cylindropuntia imbricata*	0–17	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	0–11	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0–11	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–11	–
	soapweed yucca	YUGL	*Yucca glauca*	0–11	–
	spinystar	ESVIV	*Escobaria vivipara var. vivipara*	0–6	–
14	**Other Native Shrubs**			11–34	
Tree					
15	**Trees**			0–6	
	oneseed juniper	JUMO	*Juniperus monosperma*	0–6	–

Animal community

Wildlife Interpretations
1. Reference State
1.1 Reference Community
Bouteloua gracilis-Pascopyrum smithii (blue grama-western wheatgrass)

The composition of grasses, forbs and shrubs in this community provide habitat for a variety of vertebrate species. Pollinators are attracted to the forbs expected in this plant community. Various species of beetles and grasshoppers are also present. The loamy soils support many reptile species that may use the site to meet all or parts of their life requisites including western rattlesnake, bullsnake, coachwhip, and six-lined racerunner. Birds such as horned lark, lark sparrow, Cassin's sparrow, Scaled quail, Lark bunting, Western meadowlark, and Swainson's hawks will use this community. With the exception of the Scaled quail and horned lark which live year round in this plant community, the other species are migratory and filter in in early spring to nest, raise their young, but do not winter in this community. The presence of desirable grasses and forbs will attract large mammals such as mule deer and pronghorn. Coyote, badger, and small mammals such as black-tailed jackrabbit, swift fox, black-tailed prairie dog, kangaroo rats, and several species of mice commonly use this plant community for food and cover. The reference plant community will often host many black-tailed prairie dog colonies. Other species usually associated with prairie dog colonies include mountain plover and burrowing owls.

All of the wildlife species utilizing the reference community will shift slightly seasonally depending on the local and landscape level management. Prescribed grazing by livestock can provide localized cover for ground nesting birds. It can also affect quality and quantity of forage and cover for pronghorn and mule deer. The Six-lined racerunner is negatively impacted by grasshopper control activities.

There are a few species of reptiles that occur primarily in Otero, Crowley, Bent, western Kiowa, and southern Lincoln Counties that do not often occur in the rest of the MLRA Reference state including Massasauga, western hognose snake, plains garter snake, ornate box turtle, and lesser earless lizard.

1.2 Bouteloua gracilis-Pleuraphis jamesii (blue grama-James galleta grass)

Wildlife species using this community are similar to those using the reference community.

2. Short-Grass Dominated State

2.1 Bouteloua gracilis (blue grama) Community

The loss of forbs in this community will reduce pollinator insect use. Otherwise, this community is similar enough to the reference community to harbor the same wildlife species.

3. Tilled State

3.1 Go-back Community
The loss of perennial forbs, combined with the increase in bare ground in this state results in a change in wildlife species when compared with the reference state. Grasshoppers are the most abundant insect, though a minor population of pollinators remains. Western rattlesnake and other reptiles using the reference state will still be found here. Swainson's hawks, Black-tailed prairie dogs, and their obligate species are present. Mule deer and pronghorn are absent.

3.2 Seeded Community
Wildlife species using this plant community vary depending on the seed mix.

Grazing Interpretations
The following table lists suggested initial stocking rates for an animal unit (1000 pound beef cow) under continuous grazing (yearlong grazing or growing season long grazing) based on normal growing conditions. However, continuous grazing is not recommended. These estimates should only be used as preliminary guidelines in the initial stages of the conservation planning process. Often, the existing plant composition does not entirely match any particular plant community described in this ecological site description. Therefore, field inventories are always recommended to document plant composition, total production, and palatable forage production. Carrying capacity estimates that reflect on-site conditions should be calculated using field inventories.

If the following production estimates are used, they should be adjusted based on animal kind or class and on the specific palatability of the forage plants in the various plant community descriptions. Under a properly stocked, properly applied, prescribed grazing management system that provides adequate recovery periods following each grazing event, improved harvest efficiencies will eventually result in increased carrying capacity. See USDA-NRCS Colorado Prescribed Grazing Standard and Specification Guide (528).

The stocking rate calculations are based on the total annual forage production in a normal year multiplied by 25 percent harvest efficiency divided by 912.5 pounds of ingested air-dry vegetation for an animal unit per month.

Plant Community Production (pounds per acre) and Stocking Rate (animal unit months per acre)

Reference Community 1.1 - (1100) (0.30)

Bouteloua gracilis-Pleuraphis jamesii (blue grama-James galleta grass) 1.2 - (900) (0.25)

Bouteloua gracilis (blue grama) Community 2.1 - (600) (0.15)

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide yearlong forage under prescribed grazing management for cattle, sheep, horses, and other herbivores.

All recommendations are guidelines. Actual stocking rates should be determined on-site.

Hydrological functions

Water is the principal factor limiting forage production on this site. Soils are in hydrologic groups B and C. Permeability is moderately slow to moderate, and runoff rates are very low, low, and medium.

This site primarily receives water from rainfall or occasional surface inflow from adjacent sites in a higher landscape position when present. Snow capture by shrubs in winter also provide some opportunity for additional water source, benefitting early spring "green-up." However, this is widely variable due to local site and climate conditions. Water losses occur from high evapotranspiration rates in the summer and surface runoff, especially after intense thunderstorms. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to NRCS Section 4, National Engineering Handbook (USDA–NRCS, 1972–2012) for runoff quantities and hydrologic curves).

Recreational uses

This site provides opportunities for hiking, horseback riding, wildlife viewing including bird watching, and photography. Hunting for large and small game may be available in rural areas and on public land. The wide variety of flowering plants from spring until fall are aesthetically pleasing.

Wood products

Potential source for fence posts.

Other products

None.

Other information

Relationship to Other Classifications:
NRCS Classification Hierarchy:
Physiographic Divisions of the United States (Fenneman, 1946): Physiographic DivisionPhysiographic ProvincePhysiographic SectionLand Resource RegionMajor Land Resource Area (MLRA)Land Resource Unit (LRU).

USFS Classification Hierarchy:
National Hierarchical Framework of Ecological Units (Cleland et al, 181-200):
DomainDivisionProvinceSectionSubsectionLandtype Association LandtypeLandtype Phase.

Inventory data references

NRI: references to Natural Resource Inventory data
Information presented here has been derived from data collection on private and federal lands using:
• Double Sampling (clipped 2 of 5 plots)*
• Rangeland Health (Pellant et al., 2005)
• Soil Stability (Pellant et al., 2005)
• Line Point Intercept : Foliar canopy, basal cover (Forb, Graminoid, Shrub, subshrub, Lichen, Moss, Rock fragments, bare ground, percent Litter) (Herrick et al., 2005)
• Soil pedon descriptions collected on site (Schoeneberger et al., 2012)

*NRCS double-sampling method, CO NRCS Similarity Index Worksheet 528(1).
Additional reconnaissance data collection using numerous ocular estimates and other inventory data; NRCS clipping data for USDA program support; Field observations from experienced range trained personnel. Specific data information is contained in individual landowner/user case files and other files located in county NRCS field offices.

Data Source # of Records Sample Period State County
NRI 5 2004 CO Bent
NRI 2 2007 CO Bent
NRI 3 2012 CO Bent
NRI 1 2004 CO Crowley
NRI 3 2012 CO Crowley
NRCS528 1 2014 CO Crowley
NRI 1 2004 CO Fremont
NRI 2 2008 CO Fremont
NRI 1 2013 CO Fremont
NRI 2 2010 CO Huerfano
NRCS528 1 2014 CO Huerfano
NRI 2 2005 CO Kiowa
NAP 12 2005-14 CO Kiowa

NRI 4 2010 CO Kiowa
NRCS528 1 2014 CO Kiowa
NRI 1 2007 CO Las Animas
NRI 1 2013 CO Las Animas
NRCS528 2 2014 CO Las Animas
NRI 2 2005 CO Lincoln
NRI 8 2004 CO Otero
NRI 1 2012 CO Otero
NRCS528 1 2014 CO Otero
417s 1 1982 CO Pueblo
417s 1 1983 CO Pueblo
417s 1 1984 CO Pueblo
417s 1 1985 CO Pueblo
NRI 8 2004 CO Pueblo
NRI 3 2007 CO Pueblo
NRI 5 2010 CO Pueblo
NRI 4 2012 CO Pueblo
TOTAL RECORDS 81

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Other references

Data collection for this ecological site was done in conjunction with the progressive soil surveys within the Upper Arkansas Valley (MLRA 69) of Colorado. The site has been mapped and correlated with soils in the following soil surveys: Baca County, Bent County, Crowley County, El Paso County Area, Fremont County Area, Huerfano County Area, Kiowa County, Las Animas County: Parts of Huerfano and Las Animas, Lincoln County, Otero County, Prowers County, and Pueblo Area: Parts of Pueblo and Custer Counties.

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Approval

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Ben Berlinger, Daniel Nosal, Kimberly Diller
Contact for lead author	Kimberly Diller, Ecological Site Specialist, NRCS-MLRA Soil Survey Office, Pueblo, CO

Date	01/12/2005
Approved by	Rachel E. Murph, State Rangeland Management Spec.
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None

2. **Presence of water flow patterns:** Typically none, if present water flow patterns are short and not connected.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10 percent or less bare ground, with bare patches generally less than 2-3 inches in diameter. Extended drought can cause bare ground to increase to 15-25 percent with bare patches ranging from to 12-18 inches in diameter.

5. **Number of gullies and erosion associated with gullies:** None

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Litter should be uniformly distributed with little movement. On steep slopes or knolls, litter may move from a few inches to 1-2 feet depending on intensity of storm.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class rating is anticipated to be 5-6 under canopy, and 4-6 in interspaces at soil surface. Soil surface is stabilized by decomposing organic matter. Biological crusts (lichens, algae, cyanobacteria, mosses) may be present on or just below soil surface.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Average SOM is 1-2 percent. Soils are typically deep to moderately deep, light brownish-gray, weak thin platy to weak granular structure, approximately 0-4 inches in depth.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Raindrop impact is reduced by the diverse grass, forb, shrub functional/structural groups and root structure. This slows overland flow and provides increased time for infiltration to occur. Extended drought, wildfire or both may reduce basal density, canopy cover, and litter amounts (primarily from tall,

warm-season bunch and rhizomatous grasses), resulting in decreased infiltration and increased runoff on steep slopes following intense rainfall events.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None

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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: Warm-season short bunchgrass

    Sub-dominant: Warm-season mid-grass > cool-season mid-grass

    Other: Warm-season forbs > leguminous forbs > cool-season forbs = annual forbs > shrubs > annual native grasses = sedges

    Additional: Additional: Warm-season Shortgrass (D): Blue grama, buffalograss, ring muhly, tumblegrass
    Warm-season Mid-grass (S): Galleta, sand dropseed, sideoats grama, purple threeawn
    Cool-season Mid-grass (S): Western wheatgrass, green needlegrass, squirreltail
    Warm-season Forbs (M): Dotted blazing star, gaillardia, prairie coneflower, etc.
    Annual Forbs (M): Sunflower, Texas croton, wooly plantain
    Legumes (M): American vetch, locoweed, slimflower scurfpea, purple prairie clover
    sub-shrubs: Winterfat, snakeweed, prairie sagewort (aka fringed sage)
    Shrubs (M): Fourwing saltbush, cholla, rabbitbrush, pale desert-thorn, pricklypear, yucca
    Cool season Forbs (T): Scarlet globemallow, penstemon, groundsel
    Annual grasses (T): Little barley, sixweeks fescue
    Sedges (T): Sun sedge

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Typically minimal. Expect short and mid- bunchgrass mortality and decadence during and following drought.

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14. **Average percent litter cover (%) and depth (in):** Litter cover during and following extended drought ranges from 10-20 percent.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 500 lbs/ac low precipitation years; 1,100 lbs/ac average precipitation years; 1500 lbs/ac above average precipitation years. After extended drought or the first growing season following wildfire, production may be significantly reduced by 200 – 350 lbs/ac.

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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: Invasive plants should not occur in reference plant community. Russian thistle, kochia, Cheatgrass, and other non-native annuals may invade following extended drought if a seed source is available.

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17. **Perennial plant reproductive capability:** The only limitations are weather related, wildfire, and natural disease that may temporarily reduce reproductive capability.
