USDA Natural Resources
Conservation Service

Ecological site R069XY011CO
Closed Depression

Last updated: 12/09/2024
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.

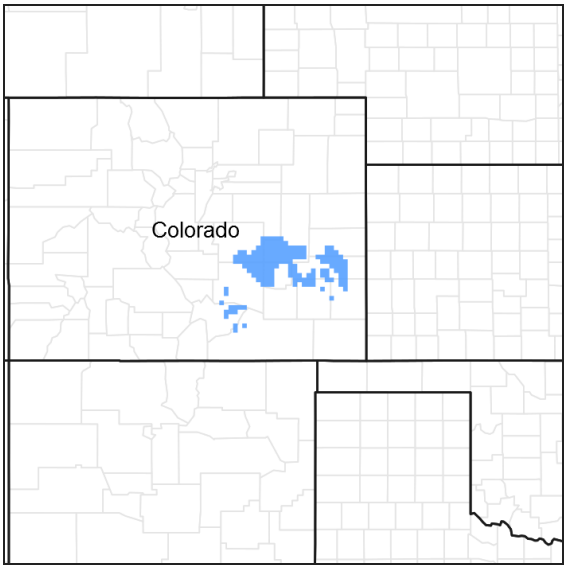


Figure 1. Mapped extent

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 (greater 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 (1930’s) 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.

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 °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 °Fahrenheit.

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

Ecological site concept

The Closed Depression is a run-on site that occurs in closed depressions and has calcium carbonate as it's only salt. It receives significant runoff from adjacent sites which increases the effective moisture. This results in more plant production than adjacent run-off sites.

Associated sites

R069XY042CO	**Clayey Plains** Clayey Plains Ecological Site is commonly adjacent to the Closed Depression Ecological Site in an upland position.
R069XY006CO	**Loamy Plains** Loamy Plains Ecological Site is commonly adjacent to the Closed Depression Ecological Site in an upland position.

Similar sites

R069XY012CO	**Saline Closed Depression** Saline Closed Depression Ecological Site has additional salts and a higher component of salt tolerant vegetation.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Pascopyrum smithii* (2) *Panicum obtusum*

Physiographic features

This site occurs on plains.

Table 2. Representative physiographic features

Landforms	(1) Closed depression
Runoff class	Negligible
Flooding frequency	None
Ponding frequency	Occasional
Elevation	1,768–1,920 m
Slope	0–1%
Ponding depth	0–61 cm
Water table depth	152 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 degrees Fahrenheit 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 degrees 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 degrees Fahrenheit. LRU B is the largest extent. MAP is 12 to 14 inches, and MAAT is 50 to 54 degrees Fahrenheit.

Table 3. Representative climatic features

Frost-free period (characteristic range)	127-134 days
Freeze-free period (characteristic range)	149-161 days
Precipitation total (characteristic range)	305-356 mm
Frost-free period (actual range)	121-135 days
Freeze-free period (actual range)	141-164 days
Precipitation total (actual range)	279-406 mm
Frost-free period (average)	129 days
Freeze-free period (average)	153 days
Precipitation total (average)	330 mm

Climate stations used

- (1) EADS [USC00052446], Eads, CO
- (2) PUEBLO RSVR [USC00056765], Pueblo, CO
- (3) CHERAW 1 N [USC00051539], La Junta, CO
- (4) ORDWAY 21 N [USC00056136], Ordway, CO
- (5) ROCKY FORD 2 SE [USC00057167], Rocky Ford, CO

- (6) PUEBLO MEM AP [USW00093058], Pueblo, CO
- (7) LA JUNTA 20 S [USC00054726], La Junta, CO
- (8) TACONY 13 SE [USC00058157], Boone, CO
- (9) ORDWAY 2 ENE [USC00056131], Ordway, CO

Influencing water features

There is no influential water table or wetland associated with this site.

Wetland description

N/A

Soil features

The soils of this site are very deep. They are moderately well drained with slow or moderately slow permeability. The surface layer thickness ranges from 2 to 6 inches thick. The soil moisture regime is ustic aridic. The soil temperature regime is mesic. Parent material kind includes alluvium and/or eolian deposits. Parent material originated from mixed sources.
Major soil series correlated to this ecological site include Ustertic Haplargids.

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

Table 4. Representative soil features

Parent material	(1) Alluvium (2) Eolian deposits
Surface texture	(1) Loam
Drainage class	Moderately well drained
Permeability class	Slow to moderately slow
Soil depth	152–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	14.22–14.73 cm
Calcium carbonate equivalent (0-101.6cm)	0–3%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	6.8–8.3
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The information in this Ecological Site Description, 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 sideoats grama, little bluestem, needle and thread, 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 for various reasons (deliberate or accidental).

The primary grass is cool-season mid- rhizomatous grass (western wheatgrass). Secondary grasses are warm-season mid- stoloniferous grass (vine mesquite), and warm-season short bunchgrass (blue grama). Other grasses and grass-likes are cool-season mid- and tall bunchgrasses (Canada wildrye, green needlegrass, bottlebrush squirreltail), warm-season short and mid-grasses (mat and ring muhly, threeawn, tumblegrass, silver beardgrass [silver bluestem], sand dropseed, galleta), warm-season short stoloniferous grass (buffalo grass), and sun sedge. Key forbs and shrubs include American vetch, purple prairie clover, scarlet globemallow, Cuman ragweed, wedgeleaf [fogfruit], fourwing saltbush, and winterfat.

Deterioration of this site due to recurring seasonal herbivory without adequate recovery opportunity following each grazing occurrence will cause vine mesquite and eventually, western wheatgrass to decrease in frequency and production. Grasses such as blue grama and buffalograss will increase. Continuous grazing without adequate recovery opportunity will eventually cause blue grama and buffalograss to form a sod bound condition. Excessive litter can result from the lack of fire and non-use. Stock water dugouts are occasionally constructed on the site to supply livestock water. This has a minor impact on the overall integrity and ecological functions of the site, and is applicable to any of the plant community phases in the reference state. This is due to the infrequent amount of ponding that occurs on the site. The immediate area of the dugout is affected due to soil disturbance and increased animal impact.

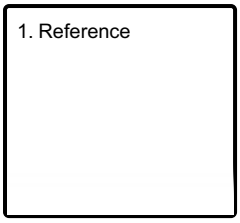
Drier and warmer climatic conditions exist in the central portion of MLRA 69 (LRU A). This area includes the eastern half of Pueblo county, northern Otero, extreme northwestern Bent, western edge of Kiowa, southern edge of Lincoln, and all of Crowley County. These conditions are primarily caused by a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

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 to over 80 percent in some locales. The long-term effects of these latest drought years have yet to be determined.

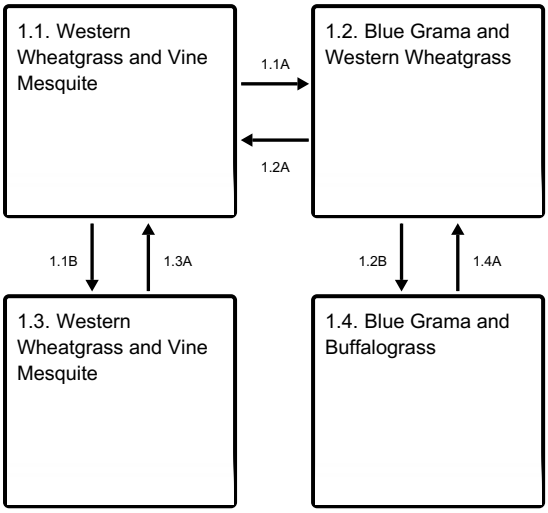
Growth of native cool-season plants begins about April 15 and continues to mid-June. Native warm-season plants begin growth about May 1 and continue to approximately August 15. Regrowth of cool-season plants occurs in September and October in most years, depending on moisture. For detailed information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

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1A - Heavy, season-long grazing. Lack of fire..

1.1B - Non-use. Lack of fire.

1.2A - Prescribed grazing. Prescribed fire.

1.2B - Heavy, season-long grazing. Lack of fire.

1.3A - Prescribed grazing. Prescribed fire.

1.4A - Prescribed grazing. Prescribed fire.

State 1
Reference

The Reference State for the Closed Depression site within MLRA 69 consists of four distinct plant community phases. These plant community phases are a reflection of all of the natural variability and grazing management affecting the ecological functioning of the site.

Dominant plant species

- fourwing saltbush (*Atriplex canescens*), shrub
- winterfat (*Krascheninnikovia lanata*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- vine mesquite (*Panicum obtusum*), grass

Community 1.1
Western Wheatgrass and Vine Mesquite

This community is the interpretive plant community for this site and is considered to be the reference plant community. This community evolved with herbivory by large herbivores and is well suited for grazing. Historically, fires occurred infrequently. The site developed with run-in water occasionally ponding intermittently during April through August. Ponded conditions most likely occurred one year in five for at least 14 consecutive days during the growing season. The potential vegetation is about 80-88 percent grasses and grass-like plants, 10-15 percent forbs and 2-5 percent woody plants. This plant community is diverse, stable, and productive. Litter is properly distributed with very little movement off-site and natural plant mortality is low. It is well suited to carbon sequestration, water yield, wildlife use by many species, livestock use, and is esthetically pleasing. Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. This community is resistant to many disturbances except

continuous grazing, long-term non-use, and tillage.

Dominant plant species

- fourwing saltbush (*Atriplex canescens*), shrub
- winterfat (*Krascheninnikovia lanata*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- vine mesquite (*Panicum obtusum*), grass

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	420	1036	1648
Forb	118	155	191
Shrub/Vine	22	43	67
Total	**560**	**1234**	**1906**

Figure 9. Plant community growth curve (percent production by month). CO6912, Cool-season dominant, warm-season subdominant, ponded..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	13	25	30	20	7	3	0	0	0

Community 1.2
Blue Grama and Western Wheatgrass

This community reflects the natural variability of recurring seasonal herbivory without adequate recovery or periodic drought. The amounts of western wheatgrass and vine mesquite grass have decreased with corresponding increases in the amounts of blue grama and buffalograss. Total annual production is reduced along with a decrease in the amount of litter on the soil surface. Blue grama and buffalo grass has increased at the expense of the primary plants in the community. Vine mesquite, Canada wildrye, and green needlegrass have decreased slightly in amount. Western wheatgrass may initially increase or decrease depending upon the season of herbivory. Forbs and shrubs are still present in decreased amounts. This plant community is at risk of losing the more desirable grasses, palatable forbs, and shrubs. Total annual production during an average year, ranges from 300 to 1500 pounds per acre air-dry weight and averages 900 pounds.

Dominant plant species

- fourwing saltbush (*Atriplex canescens*), shrub
- winterfat (*Krascheninnikovia lanata*), shrub
- blue grama (*Bouteloua gracilis*), grass
- western wheatgrass (*Pascopyrum smithii*), grass

Figure 10. Plant community growth curve (percent production by month). CO6912, Cool-season dominant, warm-season subdominant, ponded..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	13	25	30	20	7	3	0	0	0

Community 1.3
Western Wheatgrass and Vine Mesquite

This community phase represents a decrease in plant vigor resulting from low plant density and plant decadence and mortality. Species composition can be highly variable, but will most likely resemble the vegetation that was present when non-use or rest began. Species production and density will decrease as non-use and reduced fire frequency persists. Much of the nutrients are tied up in excessive litter. The semiarid environment and the absence of animal traffic to break down litter slow nutrient recycling. Aboveground litter also limits sunlight from reaching plant crowns. Many plants, especially bunchgrasses, die off. Thick litter and absence of herbivory or fire reduce

seed germination and establishment. In advanced stages, plant mortality can increase and erosion may eventually occur as bare ground increases. Total annual production can vary substantially depending on the duration of lack of disturbance.

Dominant plant species

- western wheatgrass (*Pascopyrum smithii*), grass
- vine mesquite (*Panicum obtusum*), grass

Figure 11. Plant community growth curve (percent production by month). CO6913, Cool-season/warm-season co-dominant, excess litter; MLRA-69; lowland water influenced soils..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	30	25	7	3	0	0	0

Community 1.4
Blue Grama and Buffalograss

This plant community represents the unhealthy sod bound condition that results from blue grama and buffalograss dominating the site. This community developed with repeated continuous grazing without adequate recovery opportunity between grazing events. Vine Mesquite, green needlegrass, American vetch, purple prairie clover, fourwing saltbush, and winterfat have been completely removed. Western wheatgrass may persist in trace amounts. Blue grama and buffalograss dominate the community and form a “sod bound” appearance. Red threeawn, sand dropseed, tumblegrass, bottlebrush squirreltail, hairy goldaster, and plains pricklypear increase in varying degrees. In some instances, broom snakeweed will significantly increase. This plant community is resistant to change due to grazing tolerance of blue grama and buffalograss. A significant amount of production and diversity has been lost when compared to the Reference Plant Community. Loss of the more desirable grasses, fourwing saltbush, winterfat, and nitrogen fixing forbs has negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system, “root pan”, characteristic of sod bound blue grama and buffalograss. This results in an increase of ponding duration which increases the amount of bare ground due to the loss of desirable grass and grass-like species. Total annual production, during an average year, ranges from 150 to 800 pounds per acre air-dry weight and averages 500 pounds.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass

Figure 12. Plant community growth curve (percent production by month). CO6914, Warm-season dominant; MLRA-69; lowland water influenced soils.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	15	35	30	20	0	0	0	0

Pathway 1.1A
Community 1.1 to 1.2

Recurring heavy, seasonal herbivory and lack of fire causes a shift to community 1.2. This community is characterized by reduced production from western wheatgrass and vine mesquite with a corresponding decreased amount of litter. It has not crossed an ecological threshold but will return to the interpretive plant community with normal precipitation and herbivory that allows for adequate recovery.

Pathway 1.1B
Community 1.1 to 1.3

Non-use and lack of fire will cause a shift from the interpretive plant community to the 1.3 Plant Community. The temporary lack of disturbances causes an interruption of the mineral cycle resulting in a buildup of excessive litter.

Energy flow is also impeded.

Pathway 1.2A
Community 1.2 to 1.1

Restoration of herbivory with appropriate stocking rate and adequate recovery opportunity during the growing season and prescribed fire will drive this community phase back toward the interpretive plant community.

Conservation practices

Prescribed Burning
Prescribed Grazing

Pathway 1.2B
Community 1.2 to 1.4

Continuous, heavy grazing without adequate recovery opportunity between grazing events and lack of fire will shift this plant community toward the 1.4 Community. Biotic integrity has been significantly altered due to the dominance of blue grama and buffalograss.

Pathway 1.3A
Community 1.3 to 1.1

The return of normal herbivory and fire frequencies cause this community shift back toward the interpretive plant community. This shift can occur relatively quickly.

Conservation practices

Prescribed Burning
Prescribed Grazing

Pathway 1.4A
Community 1.4 to 1.2

Long-term prescribed grazing and prescribed fire result in eventual recovery. This pathway may require over 40 years to occur.

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	**Cool-season Rhizomatous Grasses**			493–616	
	western wheatgrass	PASM	*Pascopyrum smithii*	493–616	–
2	**Warm-season Grasses**			185–258	
	vine mesquite	PAOB	*Panicum obtusum*	185–247	–
	silver beardgrass	BOLAT	*Bothriochloa laguroides ssp. torreyana*	0–22	–
3	**Warm-season Shortgrasses**			157–258	

	blue grama	BOGR2	*Bouteloua gracilis*	123–185	–
	buffalograss	BODA2	*Bouteloua dactyloides*	39–90	–
4	**Cool-season Mid- and Tall Grasses**			22–78	
	Canada wildrye	ELCA4	*Elymus canadensis*	11–39	–
	green needlegrass	NAVI4	*Nassella viridula*	0–39	–
	squirreltail	ELEL5	*Elymus elymoides*	11–22	–
5	**Other Warm-season Grasses**			0–95	
	James' galleta	PLJA	*Pleuraphis jamesii*	11–39	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–22	–
	tumblegrass	SCPA	*Schedonnardus paniculatus*	0–11	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–11	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–11	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	0–11	–
6	**Sedges**			22–62	
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	22–62	–
7	**Other Perennial Grasses**			11–34	
	Grass, perennial	2GP	*Grass, perennial*	11–39	–
Forb					
8	**Cool-season Forbs**			34–84	
	American vetch	VIAM	*Vicia americana*	11–39	–
	purple prairie clover	DAPUP	*Dalea purpurea var. purpurea*	11–22	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	11–22	–
9	**Warm-season Forbs**			0–112	
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–22	–
	tarragon	ARDR4	*Artemisia dracunculus*	0–11	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–11	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–11	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–11	–
	wedgeleaf	PHCU3	*Phyla cuneifolia*	0–11	–
	oppositeleaf bahia	PIOP	*Picradeniopsis oppositifolia*	0–11	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–11	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–11	–
10	**Posionous Forbs**			0–34	
	woolly locoweed	ASMO7	*Astragalus mollissimus*	0–11	–
	silky sophora	SONU	*Sophora nuttalliana*	0–11	–
	poison suckleya	SUSU2	*Suckleya suckleyana*	0–11	–
11	**Other Perennial Forbs**			11–62	
	Forb, perennial	2FP	*Forb, perennial*	11–62	–
Shrub/Vine					
12	**Warm-season Shrubs**			22–84	
	fourwing saltbush	ATCA2	*Atriplex canescens*	11–62	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	11–22	–
13	**Other Shrubs**			0–34	

13	**Other Shrubs**			0–34	
	rubber rabbitbrush	ERNAG	*Ericameria nauseosa ssp. nauseosa var. glabrata*	0–11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–11	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–11	–
14	**Other Shrubs Not Listed**			11–39	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	11–39	–

Other products

Site Development & Testing Plan:

General Data (MLRA and Revision Notes, Hierarchical Classification, Ecological Site Concept, Physiographic, Climate, and Water Features, and Soils Data):

- Updated, All “Required” items complete to Provisional level

Community Phase Data (Ecological Dynamics, STM, Transition & Recovery Pathways, Reference Plant Community, Species Composition List, Annual Production Table):

- Updated. All “Required” items complete to Provisional level.

NOTE: Annual Production Table and Species Composition List were developed from preliminary soil/veg site investigations. This site concept was developed by local range professionals and soil scientists. The site concept will need to be tested and further data collection and analysis is needed to develop this site to the next Approved level.

Each Alternative State/Community:

- Complete to Provisional level.

- 2.0 Altered Hydrology State. Does this state exist? The soils and water features of this site indicate no hydric soils, or influential water features, other than occasional ponding. Further discussion needed.

- CP 1.1 to 1.2, does extended drought reduce blue grama/buffalograss in a swale (run-on) position like it does on “Plains” sites.

- The CP 1.4 to 1.2 is questionable in the length of time required. Will need further further discussion.

Site Interpretations (Wildlife, Livestock, Hydrology, Recreational, Wood Products, Other)

- (RESERVED). Will be developed for this site at the next “Approved” level.

Supporting Information (Site Interpretations, Assoc. & Similar Sites, Inventory Data References, Agency/State Correlation, References):

- All “Required” items complete to Provisional level.

- There are no existing NRI or 417 Inventories for this site. More field data collection is needed to support this site concept.

Rangeland Health Reference Sheet:

- (DRAFT, April 19, 2011).

“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 and medium 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.” (NI 430_306 ESI and ESD, April, 2015)

Other information

Relationship to Other Classifications:
NRCS Classification Hierarchy:
Physiographic Divisions of the United States (Fenneman, 1946): Physiographic Division>Physiographic Province>Physiographic Section>Land Resource Region>Major Land Resource Area (MLRA)>Land Resource Unit (LRU).

USFS Classification Hierarchy:
National Hierarchical Framework of Ecological Units (Cleland et al, 181-200):
Domain>Division>Province>Section>Subsection>Landtype Association> Landtype>Landtype 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, % 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.

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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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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 & Lee Neve
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Date	04/19/2011
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** None. Minor water flow patterns may be present on bare areas resulting from ponded water, however they will be short and disconnected.

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

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** The amount of bare ground is minimal due to excellent plant and litter cover on the soil surface. Expect bare ground to be two to five percent.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Minor wind scour may be present on bare areas resulting from ponded water, the extent will be correlated to the size of the bare area.

7. **Amount of litter movement (describe size and distance expected to travel):** None. Expect minimal to very short movement of small sized herbaceous litter during intense rainfall events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class rating anticipated to be five to six in interspace at soil surface. These values need verification at reference site.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon is zero to three inches deep, brown, loam, moderate fine granular structure with common very fine and fine roots. EB horizon 3-11 inches, 60percent gray & 40 percent brown, loam, weak medium subangualar blocky structure, common very fine and fine roots. SOM content is unspecified for either the A or EB soil horizons.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, forb and shrub functional/structural groups and diverse root structure/patterns reduces raindrop impact and slows runoff providing increased time for infiltration to occur.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Usually none. Soil horizon 2Bssg (argilic) at 11-34 inches extremely hard and may be mistaken as a compaction layer. Expect this soil horizon to commonly exhibit very fine roots.

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: Cool-season rhizomatous grasses >

    Sub-dominant: Warm-season mid-height grasses > Warm-season short-height grasses > shrubs >

    Other: Warm-season forbs > Cool-season forbs > Warm-season short-height rhizomatous grass = Cool-season mid-height bunchgrasses = sedges

    Additional:

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

14. **Average percent litter cover (%) and depth (in):** Expect litter cover to decrease to 20-30 percent during and following

extended drought.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 500 pounds per acre in low precipitation years, 1100 pounds per acre in average precipitation years, and 1700 pounds per acre in above agerage precipitation years. After extended drought or the first growing season following wildfire, prduction may be significantly reduced by 250-350 pounds per acre.

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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 the reference plant community.

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17. **Perennial plant reproductive capability:** The only limitations are weather related and wildfire incidents.
