USDA Natural Resources Conservation Service

Ecological site R049XY213CO
Cobbly Foothill

Last updated: 4/09/2025
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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.

MLRA notes

Major Land Resource Area (MLRA): 049X–Southern Rocky Mountain Foothills

MLRA 49 is in Colorado (58 percent), Wyoming (27 percent), and New Mexico (15 percent). It makes up about 11,130 square miles (28,845 square kilometers). The major cities in or adjacent to this MLRA are Laramie, Wyoming; Fort Collins, Boulder, Denver, Colorado Springs, and Pueblo, Colorado; and Santa Fe and Las Vegas, New Mexico. Interstates 25, 70, and 80 cross the MLRA. Part of the Medicine Bow National Forest is in the northern tip of this area, in Wyoming; parts of the Roosevelt, Pike, and San Isabel National Forests are in this area in Colorado; and part of the Santa Fe National Forest is in the southern end of this area, in New Mexico. The Rocky Flats Nuclear Arsenal, Peterson Air Force Base, most of the Air Force Academy grounds, and part of the Fort Carson Military Reservation are in the part of this area in Colorado.

Almost half of this area is in the Southern Rocky Mountains and Wyoming Basin Provinces in the Rocky Mountain System. The rest is in the Colorado Pediment, Raton, and High Plains Sections of the Great Plains Province of the Interior Plains. The northern part of the MLRA consists of the Laramie Mountains. The central and southern parts generally are bounded on the east by the Great Plains and on the west by the Southern Rocky Mountains. Elevation ranges from 5,000 feet (1,525 meters) to 8,000 feet (2,440 meters) in most of the MLRA, but small mountains in the area are as high as 10,000 feet (3,050 meters). The Laramie and North Platte Rivers and their associated tributaries are the principal streams in the Wyoming portion of the MLRA. The Cache La Poudre, Big Thompson, Saint Vrain, South Platte, Arkansas, Saint Charles, Huerfano, Cucharas, and Purgatoire Rivers, Clear Creek, Fountain Creek, and their associated tributaries are the principal streams in the Colorado portion. The Vermejo, Cimarron, Pecos, and Mora Rivers and their associated tributaries are the principal streams in the New Mexico portion.

This area has been impacted by the geologic processes of uplift, folding, and faulting and by subsequent erosion and deposition. The Southern Rocky Mountains were uplifted 50 to 70 million years ago during the Laramide uplift. Most of this MLRA is adjacent to this uplift and was also affected. The uplift induced erosion of the relatively soft Late Pennsylvanian to Cretaceous sedimentary rocks from the uplands and dissected the underlying crystalline Precambrian rocks. The relief of the area was reduced by a combination of erosion of uplands and alluvial filling. Approximately 7 million years ago, a large portion of the area was uplifted again to elevations of 14,000 feet (4,270 meters) or more at the core of the Laramide uplift. Since then, precipitation occurring as both rain and snow led to the renewal of erosion and subsequent alluvial fills. The Wyoming portion of the MLRA, the Laramie Mountains, consists primarily of Precambrian plutonic rocks with Pennsylvanian and Permian sedimentary rocks folded and faulted at the margin of the range. The Colorado and New Mexico portions of the area consist primarily of remnants of the uplifted and folded Pennsylvanian through Cretaceous sedimentary rocks forming hogbacks, ridges, and hills, the ranges of which trend in a general north-south direction, parallel to the uplifted Southern Rocky Mountains. Tertiary volcanic flows filled valleys in some areas. After extensive erosion, these more resistant volcanic rocks now form prominent mesas, such as North and South Table Mountains near Golden, Colorado, and Fishers Peak Mesa near the Colorado-New Mexico border. Stream erosion from the eastern front of the Southern Rocky Mountains fostered the creation of a sequence of large alluvial fan remnants, pediments, and terrace deposits in this MLRA.

The average annual precipitation is 12 to 25 inches (305 to 635 millimeters) in most of this area, but it ranges from 10 to 35 inches (255 to 890 millimeters), generally increasing with elevation. The highest precipitation occurs in the Laramie Mountains, in Wyoming, and the lowest precipitation occurs in the Arkansas River Valley, above Salida, Colorado. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Winter precipitation occurs as snow. The average annual temperature is 36 to 54 degrees F (2 to 12 degrees C). The freeze-free period averages 140 days and ranges from 90 to 195 days, decreasing in length with elevation and from south to north.

The dominant soil orders in this MLRA are Mollisols, Alfisols, Inceptisols, and Entisols. The soils in the Colorado and New Mexico portions of the MLRA dominantly have a frigid or mesic soil temperature regime. Those in the Wyoming portion have a frigid or cryic soil temperature regime. A few of the higher peaks and some north aspects have a cryic soil temperature regime. Most of the soils in the area have an ustic soil moisture regime, but those on the higher peaks and on some north aspects have a udic soil moisture regime. The soils in the area dominantly have smectitic or mixed mineralogy. They are very shallow to very deep and are dominantly well drained. The texture is dominantly loamy in soils that formed in material weathered from igneous and metamorphic rocks and is dominantly loamy or clayey in soils that formed in material weathered from sedimentary rocks. Some of the most extensive and representative great groups are Haplustolls (Baller series), Argiustolls (Nederland, Nunn, Santa Fe, and Enmedio series), Haplustalfs (Fort Collins, Stoneham, and Dargol series), Haplustepts (Stout series), Ustorthents (Lorencito

and Saruche series), and Paleustolls (Flatirons series). (USDA-NRCS, 2006)

Classification relationships

NRCS:
Major Land Resource Area 49, Southern Rocky Mountain Foothills (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS:
M331Ib – North Front Range; M331Ic – North Laramie Mountains; M331Id – South Laramie Mountains; and M331Ii – Northern Arkansas Granitics – 39 mile Mountain M331I – Northern Parks and Ranges M331 - Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331Fb – Wet Mountains; M331Fc – Wet Mountain Valley; M331Ff – Raton Basin; M331Fg – Sangre de Cristo Mountains Woodland; and M331Fh – Sangre de Cristo Mountains Coniferous Forest M331F – Southern Parks and Rocky Mountain Range M331 - Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

331If – Arkansas Valley Tablelands; 331Ig- Arkansas Valley High Tablelands; 331Ih – Black Forest; and 331Ii – Southern Front Range Foothills < 331I – Arkansas Tablelands < 331 Great Plains – Palouse Dry Steppe

331Ha – Southern Denver-Julesburg Basin; 331Hc – Eastern Central High Plains; 331He – Northern Front Range Foothills and 331Hf – Denver-Julesburg Basin < 331H – Central High Plains < 331 Great Plains – Palouse Dry Steppe

EPA:
21b – Crystalline Subalpine Forests, 21c – Crystalline Mid-Elevations Forests, 21d - Foothill Shrublands, 21e – Sedimentary Subalpine Forests, and 21f – Sedimentary Mid-Elevation Forests, 21j – Grassland Parks < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains North American Deserts (Griffith, 2006).

25c – Moderate Relief Plains, 25d – Flat to Rolling Plains, and 25l – Front Range Fans < 25 High Plains < 9.4 South Central Semi-Arid Prairies < 9 Great Plains (Griffith, 2006).

26e – Piedmont Plains and Tablelands, 26f- Mesa de Maya/Black Mesa, 26h- Pinyon-Juniper Woodlands and Savannas, 26i – Pine-Oak Woodlands, 26j – Foothills Grasslands, 26k – Sandsheets, and 26l – Upper Canadian Plateau < 26 Southwestern Tablelands < 9.4 South Central Semi-arid Prairies < 9 Great Plains (Griffith, 2006).

USGS:
Southern Rocky Mountain Province, Colorado Piedmont and Raton

Ecological site concept

R049XY213CO Cobbly Foothill occurs on fans, terraces, stream terraces, fan terraces, mesas and cuestas. Slopes is between 5 to 25 percent. Soils are moderately deep to very deep with depths of greater than 20 inches. Soils are derived from alluvium, colluvium and/or residuum primarily from sandstone and//or sedimentary rock. Soil surface texture is extremely cobbly sandy loam, stony sandy loam, cobbly sandy loam or extremely cobbly loam. Family particle size is loamy-skeletal or clayey skeletal. It is a Mountain Muhly – Big Bluestem community. It has a typic ustic moisture regime. The effective precipitation ranges from 15 to 18 inches.

Associated sites

R049XD202CO	**Loamy Foothill 11-14 PZ** This site occurs on fans, fan remnants, hills, hillslopes, and valley sides. Slopes is between 0 to 20%. Soils are moderately deep to very deep with depths of greater than 20 inches. Soils are derived from alluvium and residuum from sedimentary rocks (sandstone, siltstone and shale). Soil surface texture is loam, silt loam or very fine sandy loam. Family particle size is loamy. It is a Winterfat – Four-wing saltbush – Western wheatgrass – Blue grama plant community. It has a typic ustic moisture regime. The effective precipitation ranges from 14 to 19 inches.
EX049X01X202	**Loamy Foothill Palmer Divide** This site occurs on fans, fan remnants and hills. Slopes is between 0 to 10%. Soils are moderately deep to deep in depths of greater than 20 inches. Soils are derived from alluvium from sandstone. Soil surface texture is fine sandy loam, loam clay loam or silty clay loam. Family particle size is loamy. It is a Winterfat – Western wheatgrass – Blue grama plant community. It has ustic aridic/aridic ustic moisture regime. The effective precipitation ranges from 11 to 14 inches.

Similar sites

R049XY214CO	**Gravelly Foothill** This site occurs on gently rolling and sloping uplands. Slopes is between 0 to 35%. Soils are deep and greater than 60 inches in depth. Soils are derived from slopes alluvium, alluvium and colluvium from arkose or igneous and metamorphic rocks. Soil surface texture is gravelly, sandy loam, cobbly sandy loam, gravelly loam or very gravelly loam. Family particle size is sandy-skeletal, loamy-skeletal or fine-loamy over sandy-skeletal. It is a Little Bluestem – Needle-and-Thread community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 16 inches.

R049XB212CO	**Shaly Foothill** This site occurs on break areas with short steep slopes that expose the raw shale parent material. Slopes is between 3 to 35%. Soils are shallow with depths of 6 to 20 inches. Soils are derived from slopes alluvium, and/or residuum primarily from shale or clayey shale. Soil surface texture is clay, clay loam, silt loam or gravelly clay loam. Family particle size is clayey or loamy. It is a Western Wheatgrass– Green Needlegrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 13 to 18 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Muhlenbergia montana* (2) *Andropogon gerardii*

Physiographic features

Elevation ranges from 5,500 to 7,300 feet. Topography is nearly level to hilly exposure.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Terrace (3) Stream terrace (4) Fan terrace (5) Mesa (6) Cuesta
Runoff class	Medium
Flooding frequency	None
Ponding frequency	None
Elevation	5,500–7,300 ft
Slope	5–25%

Climatic features

Average annual precipitation ranges from 15 to 18 inches. Optimum growing season for native plants is spring and summer. Snow falls in March, April and May and constitutes up to 25 percent of the annual moisture.

Table 3. Representative climatic features

Frost-free period (characteristic range)	105-120 days

Freeze-free period (characteristic range)	130-145 days
Precipitation total (characteristic range)	16-18 in
Frost-free period (actual range)	101-125 days
Freeze-free period (actual range)	127-147 days
Precipitation total (actual range)	15-18 in
Frost-free period (average)	113 days
Freeze-free period (average)	137 days
Precipitation total (average)	17 in

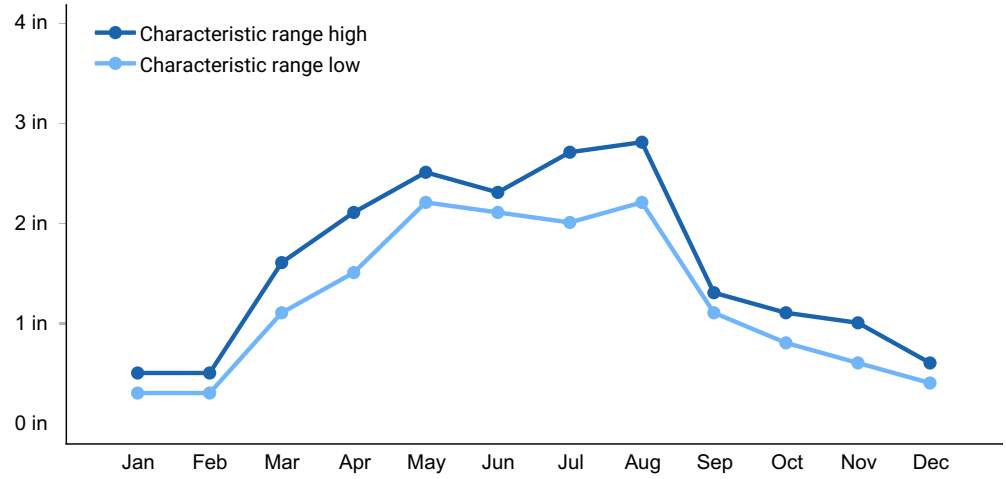


Figure 1. Monthly precipitation range

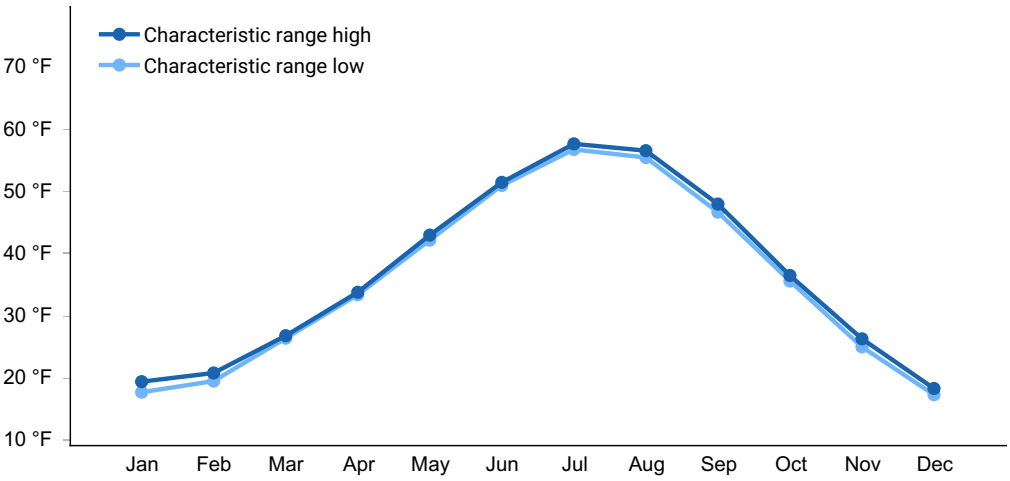


Figure 2. Monthly minimum temperature range

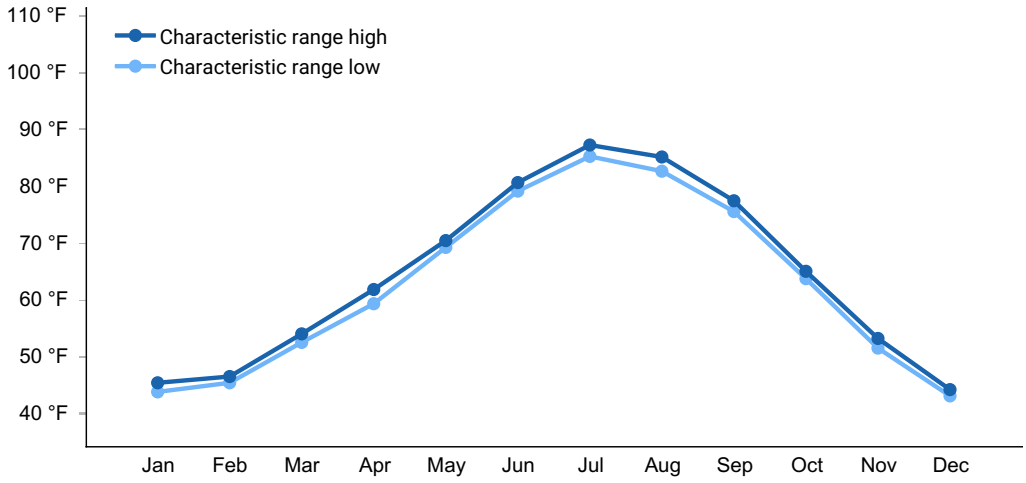


Figure 3. Monthly maximum temperature range

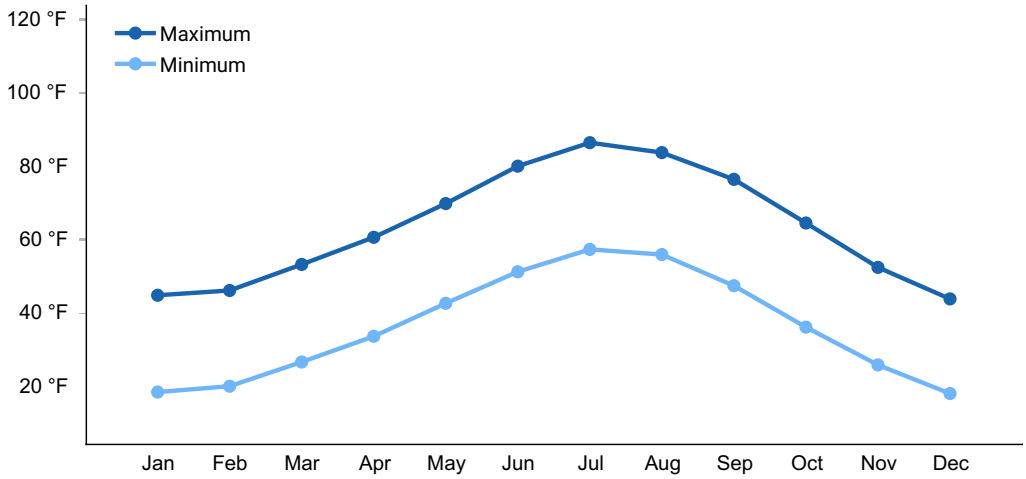


Figure 4. Monthly average minimum and maximum temperature

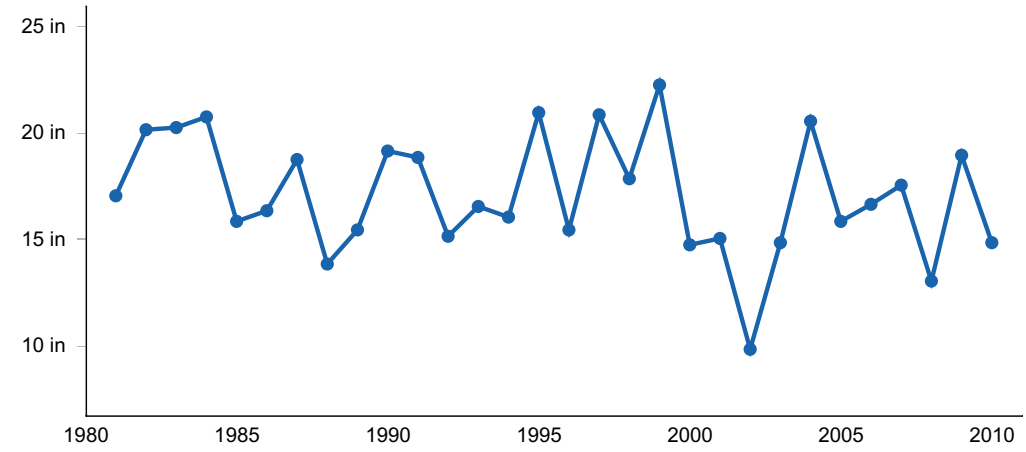


Figure 5. Annual precipitation pattern

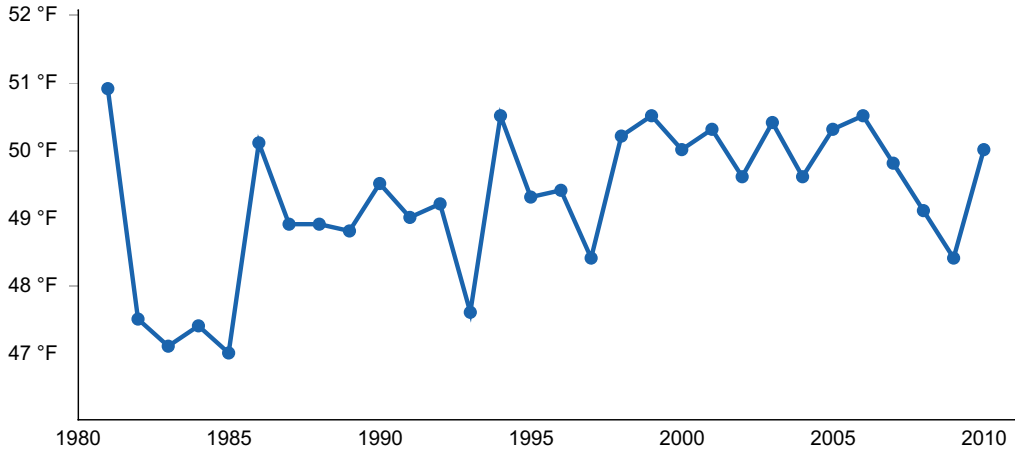


Figure 6. Annual average temperature pattern

Climate stations used

- (1) PARKER 6 E [USC00056326], Parker, CO
- (2) DENVER CENTENNIAL AP [USW00093067], Englewood, CO
- (3) COLORADO SPRINGS MUNI AP [USW00093037], Colorado Springs, CO
- (4) WATERDALE [USC00058839], Loveland, CO
- (5) CASTLE ROCK [USC00051401], Castle Rock, CO

Influencing water features

None

Wetland description

N/A

Soil features

Cobbles, with some gravels and boulders, are mixed with soils which are generally sandy loam and sandy clay loam but are occasionally loam, or clay loam. The cobbles reduce the volume of effective soil, but have the beneficial effect of concentrating the moisture in a smaller volume of soil than a cobble-free soil would have. Because of these soil conditions, tall prairie-grasses can grow on this site in this precipitation zone.

Soils in this site are:
Curecanti variant extremely cobbly loam
Nederland extremely cobbly sandy loam
Nederland stony sandy loam

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone (2) Residuum–sandstone (3) Alluvium (4) Colluvium
Surface texture	(1) Extremely cobbly, stony, cobbly sandy loam (2) Extremely cobbly loam
Family particle size	(1) Loamy-skeletal (2) Clayey-skeletal
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	20–100 in
Surface fragment cover <=3"	10–20%
Surface fragment cover >3"	18–30%
Available water capacity (Depth not specified)	1.9–3.9 in
Calcium carbonate equivalent (Depth not specified)	0%
Electrical conductivity (Depth not specified)	0 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	15–30%
Subsurface fragment volume >3" (Depth not specified)	15–25%

Ecological dynamics

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

The Cobbly Foothill ecological site is characterized by four states: Reference, Shortgrass Dominated, Increased *Bare Ground*, and Invaded States. The Reference State is characterized by Mixed Mid/Tall Grasses (Reference Community) that is dominated by

mountain muhly, big/little bluestem, blue grama, various forbs and shrubs and secondary cool-season mid-height bunchgrass (green needlegrass). The Shortgrass State is characterized by a warm-season short bunchgrass (blue grama), and secondary warm-season short stoloniferous grass (buffalograss). The Annuals and Forbs State is characterized by early successional warm-season bunchgrass (Fendler threeawn), cool-season bunchgrass (sleepygrass, squirreltail), annual grasses, annual forbs, and soapweed yucca. The Invaded State has been disturbed by equipment and includes early successional annual plants as well as invasive species (knapweeds, yellow toadflax).

The degree of grazing has a significant impact on the ecological dynamics of the site. This region was historically occupied by large grazing animals such as bison and elk, along with pronghorn and mule deer. Grazing by these large herbivores, along with climatic and seasonal weather fluctuations, had a major influence on the ecological dynamics of the site.

Historically, it is believed, grazing patterns by herds of large ungulates was driven by water distribution, precipitation events, drought events, and fire. It is believed that grazing periods would have been shorter, followed by longer recovery periods. These large migrating herds impacted the ecological processes of nutrient and hydrologic cycles, by urination, trampling (incorporation of litter into the soil surface), and breaking of surface crust, to increase water infiltration.

The soil moisture regime is favorable to the production of mid and tallgrass species giving this range site a rolling, mixed prairie aspect. Cobbles are mixed with the soils which reduce the volume of effective soil but have the beneficial effect of concentrating the moisture in a smaller volume of soil that a cobble-free soil would have. Big bluestem, mountain muhly, little bluestem, blue grama, western wheatgrass, sideoats grama, Indiangrass and switchgrass make up most of the plant community and provide about 60-75% of the total production. Plants such as green needlegrass, prairie junegrass, Sandberg bluegrass, prairie sandreed, needle and thread, American vetch and purple prairie clover are secondary in the plant community. Small amounts of sand dropseed, sun sedge, and dotted blazing star are scattered throughout the plant community. Shrubs that can occur are skunkbush sumac, alderleaf mountain mahogany and prairie rose.

This site developed with occasional fires being part of the ecological processes. Historic fire frequency (pre-industrial), is estimated at 10- 12 years (Guyette, 2012), randomly distributed, and started by lightning at various times throughout the growing season. Dendroecological reconstructions of fire history showed that fires burned during years of extreme drought (2011. Schoennagel, Sherriff, Veblen).

Early human inhabitants were also likely to start fires for various reasons (deliberately or accidentally). Both of these types of fire events likely impacted the site by leaving mosaic vegetation patterns. The impact of fire over the past 50 years has been relatively insignificant due to wildfire suppression and the lack of acceptance of prescribed fire as a management tool. However, prolonged drought, coupled with fire suppression has

increased the frequency and intensity of periodic wildfires in the area.

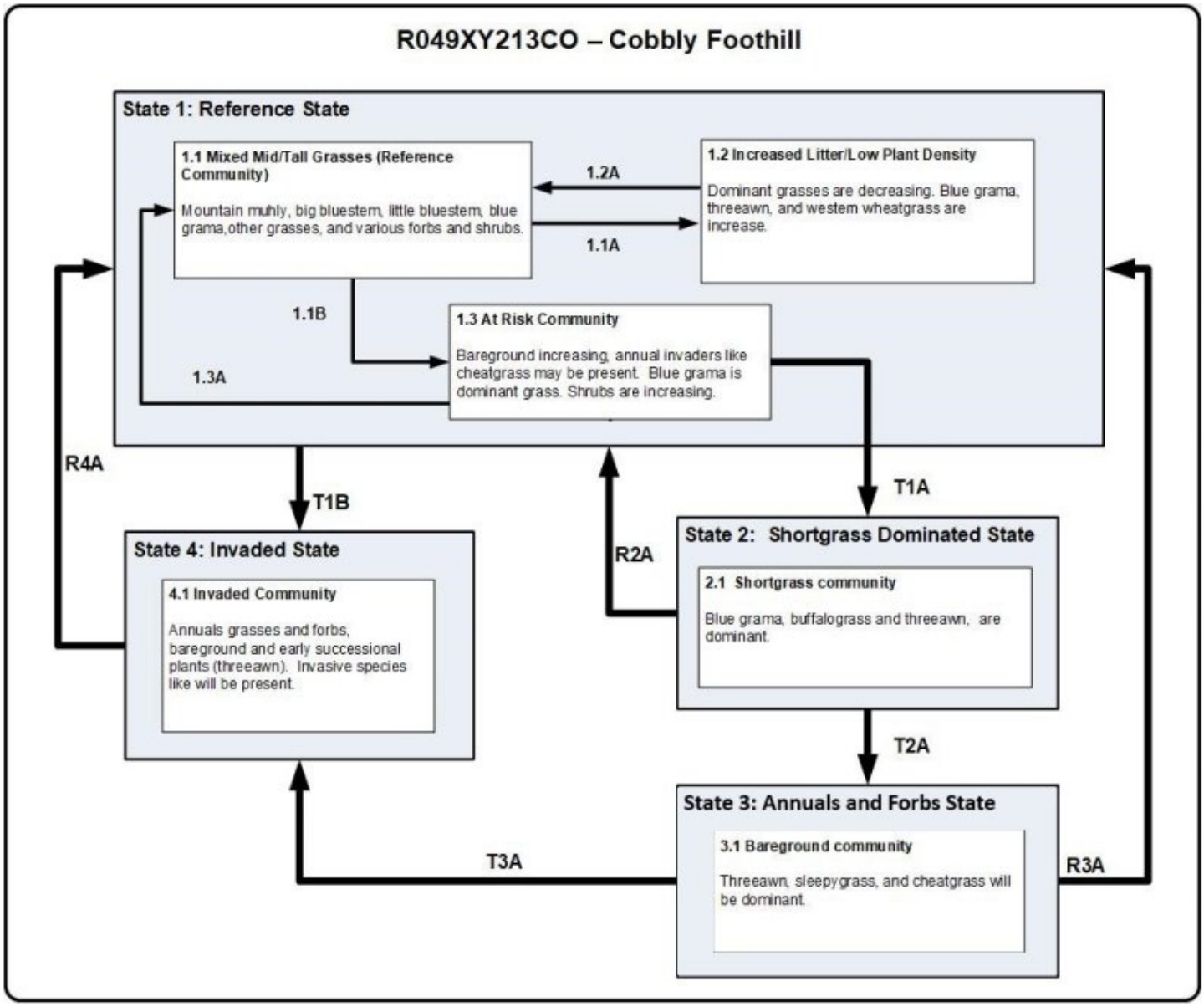
Deterioration of this site, due to continuous grazing without adequate recovery periods following each grazing occurrence and/or overstocking, will cause blue grama to increase. Cool-season grasses such as green needlegrass and western wheatgrass will decrease. Warm-season grasses such as big bluestem, Indiangrass and palatable forbs such as American vetch and purple prairie clover will also decrease. Fendler threeawn, annuals and bare ground increase under heavy continuous grazing. Lack of grazing and lack of fire initially causes increased herbaceous litter. Decadence of bunchgrasses, such as green needlegrass and Indian ricegrass, and lower vigor vegetation is expected to occur with non-use and lack of fire. This also allows invasive species like diffuse knapweed, spotted knapweed, cheatgrass, toadflax and other similar vegetation to establish. Grazing which allows adequate recovery periods following each grazing event and proper stocking will maintain the palatable plants.

Drought and/or early killing frost cycles have historically impacted the vegetation. Changes in species composition will vary depending upon the duration and severity of the drought and/or frost cycle.

Today, much of this site is urban/suburban residence and small acreage development. Residential development leads to fire suppression. This is an important site for livestock grazing, especially beef cattle. Today the management of livestock grazing has been a major influence on the ecological dynamics of the site. This management, coupled with the effects of annual climatic variations, largely dictates the plant communities for the site.

The following diagram illustrates the common plant communities that can occur on the site and the pathways (arrows) among communities. Bold lines surrounding each plant community or communities represent ecological thresholds and a plant community state. Community phase pathways in the reference state represent shifts in the plant community within the natural range of variability. Transition and Restoration pathways represent the plant community crossing an ecological threshold between states. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

State and transition model



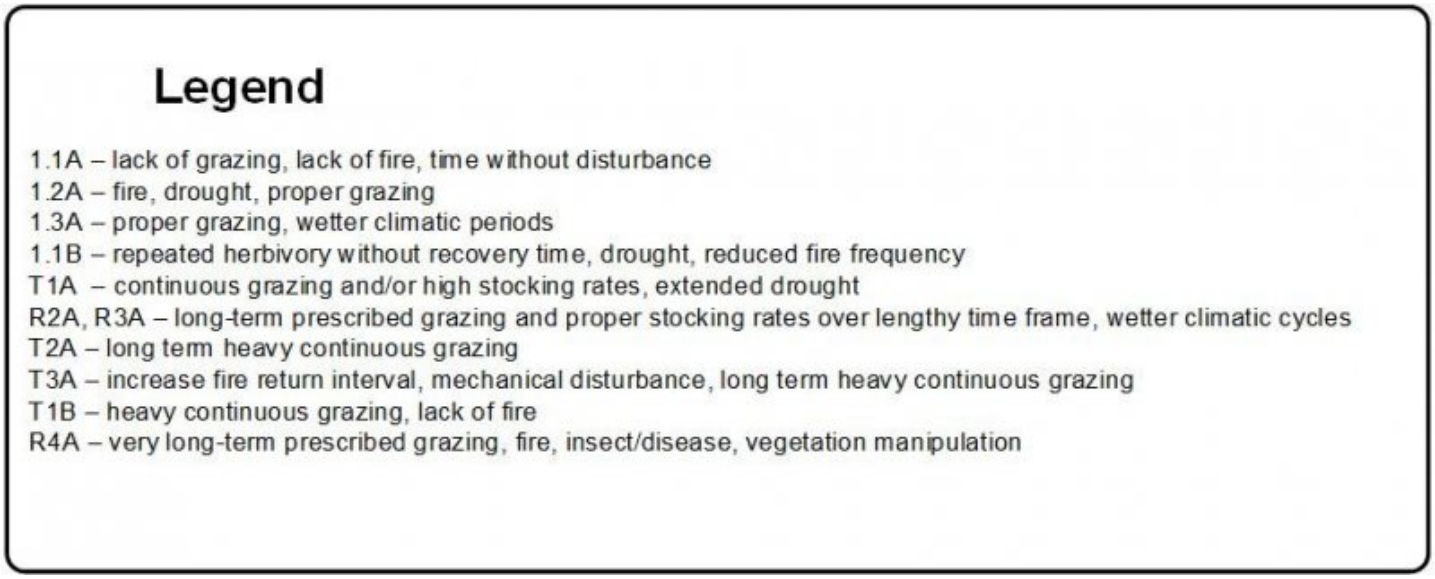


Figure 7. Legend

State 1
Reference

The Reference State is characterized by three distinct plant community phases; Reference Plant Community, At Risk Plant Community, and Increased Litter/Low Plant Density Plant Community. These plant communities, and the various secessional stages between them, represent the natural range of variability due to the disturbance regimes applicable to this site. This site has a rolling grassland aspect with mid/tall grasses dominating. Big bluestem and mountain muhly clearly dominate the plant community. Other warm-season tallgrasses are also abundant. Western wheatgrass and green needlegrass are dominant cool-season grasses on this site. Plants such as blue grama, Sandberg bluegrass, sun sedge, American vetch and purple prairie clover are secondary in the plant community. Prairie junegrass, buffalograss, needle and thread, bottlebrush squirreltail, Fendler threeawn, slimflower scurfpea, skunkbush sumac and prairie rose occur in small amounts in scattered distribution. Following is the narrative for the reference plant community. This plant community may not represent every possibility, but it probably is the most prevalent and repeatable plant community. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Community 1.1
Reference Plant Community

This is the interpretive plant community. This plant community evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. It can be found on areas that are properly managed with prescribed grazing that allows for adequate recovery periods following each grazing event. The potential vegetation is about 75-85% grasses and grass-like plants, 10-20% forbs, and 1-10% shrubs (air-dry weight). The major grasses in the Reference Plant Community include mountain muhly, big bluestem, little bluestem, blue grama, Indiangrass, western wheatgrass and sideoats grama. These plants provide valuable forage throughout the growing season. Sub-dominant grasses include Sandberg bluegrass, switchgrass and prairie junegrass. Major forbs include American vetch, purple prairie clover, upright prairie coneflower, and dotted blazing star. Dominant shrubs include skunkbush sumac, alderleaf mountain mahogany and prairie rose. Overgrazing with cattle-will cause desirable grasses such as big bluestem, mountain muhly, little bluestem, Indiangrass and green needlegrass to decrease. Overgrazing by sheep will cause desirable forbs and shrubs to be reduced. With the decrease of above-mentioned plants blue grama, Fendler threeawn, and sleepygrass will increase initially. Heavy continuous grazing will cause plants such as cheatgrass, yellow toadflax and knapweed to invade the site. This plant community is diverse, and productive. Litter is properly distributed with very little movement off-site, and natural plant mortality is very low. It is well-suited to carbon sequestration, effective water cycle, and wildlife use by

many species, livestock use, and is aesthetically pleasing. Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. This community is resistant to disturbances except moderate to heavy continuous grazing and/or development into urban or other uses. Total annual production ranges from 1450 to 2500 pounds of air-dry vegetation per acre and will average 2000 pounds during an average year. Of this production, 5 to 10% will likely be unpalatable out of reach of grazing animals. These production figures are the fluctuations expected during favorable, normal and unfavorable years due to the timing and amount of precipitation and temperature. Total annual production should not be confused with species productivity, which is annual production and variability by species throughout the extent of the community phase. Resilience management. Grazing management that provides for proper stocking and adequate recovery opportunity following each grazing event will maintain this community and provide sustainable ecosystem goods and services from the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1203	1625	2000
Forb	225	275	375
Shrub/Vine	22	100	125
Total	**1450**	**2000**	**2500**

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			1300–2100	
	mountain muhly	MUMO	*Muhlenbergia montana*	200–400	–
	big bluestem	ANGE	*Andropogon gerardii*	300–400	–
	little bluestem	SCSC	*Schizachyrium scoparium*	200–300	–
	blue grama	BOGR2	*Bouteloua gracilis*	100–200	–
	Indiangrass	SONU2	*Sorghastrum nutans*	100–200	–
	switchgrass	PAVI2	*Panicum virgatum*	60–140	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	100–140	–
	western wheatgrass	PASM	*Pascopyrum smithii*	100–140	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	60–100	–
	Sandberg bluegrass	POSE	*Poa secunda*	40–60	–

	green needlegrass	NAVI4	*Nassella viridula*	20–60	–
	Grass, native	2GN	*Grass, native*	40–60	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	20–60	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	20–60	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	20–40	–
	prairie dropseed	SPHE	*Sporobolus heterolepis*	0–40	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–20	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–20	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–20	–
Forb					
2	**Forbs**			150–450	
	American vetch	VIAM	*Vicia americana*	40–120	–
	purple prairie clover	DAPU5	*Dalea purpurea*	40–100	–
	Forb, native	2FN	*Forb, native*	10–100	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	20–60	–
	dotted blazing star	LIPU	*Liatris punctata*	10–60	–
	Fendler's sandwort	ARFE3	*Arenaria fendleri*	10–20	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	10–20	–
	beardtongue	PENST	*Penstemon*	10–20	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	10–20	–
	bastard toadflax	COUM	*Comandra umbellata*	0–10	–
	cinquefoil	POTEN	*Potentilla*	0–10	–
	false boneset	BREU	*Brickellia eupatorioides*	0–10	–
	Indian paintbrush	CASTI2	*Castilleja*	0–10	–
	larkspur	DELPH	*Delphinium*	0–10	–
	lupine	LUPIN	*Lupinus*	0–10	–
	prairie fleabane	ERST3	*Erigeron strigosus*	0–10	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–10	–
	Richardson's geranium	GERI	*Geranium richardsonii*	0–10	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–10	–

	buckwheat				
	textile onion	ALTE	*Allium textile*	0–10	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	0–10	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–10	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–10	–
	winged buckwheat	ERAL4	*Eriogonum alatum*	0–10	–
Shrub/Vine					
3	**Shrubs**			50–150	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	10–80	–
	skunkbush sumac	RHTR	*Rhus trilobata*	20–60	–
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	10–20	–
	prairie rose	ROAR3	*Rosa arkansana*	10–20	–
	chokecherry	PRVIV	*Prunus virginiana var. virginiana*	0–20	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–20	–
	soapweed yucca	YUGL	*Yucca glauca*	0–10	–
	wax currant	RICE	*Ribes cereum*	0–10	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–10	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–10	–

Animal community

Livestock Grazing:

This site produces excellent forage for cattle and horses during years of average precipitation. It provides fair to good forage for sheep, pronghorn and deer.

The animal forage preference changes as the growing season progresses. Western wheatgrass, green needlegrass, and needle and thread are very palatable during the spring. Therefore, it is necessary to periodically defer grazing in the spring and early summer so that these cool season plants are not overgrazed and replaced by less desirable species. Deferment of grazing through the late spring and summer months will benefit the warm season plants.

It is important that proper grazing use and planned deferred rotation grazing be followed on this site. This level of grazing management will ensure maximum utilization of the available forage while maintaining the desirable plants.

Vegetation palatability will influence proper use considerations. The season of use, kind of grazing animal, past grazing use, and the plant composition will directly influence the animal preference and performance.

Guide to Initial Stocking Rates (Stocking rates recommendations from site concept circa 1989 and based on estimated plant community succession):

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

Plant Community (PC); Production (lbs./acre); Stocking Rate (AUM/acre)
Reference PC/ 2000/ 0.55
Increased Litter/Decadence PC/ 1200/ 0.33
At Risk PC/ 1400/ 0.38
Shortgrass PC/ 800/ 0.22
Bare Ground PC/ */ *
Invaded PC/ */ *
* Highly variable; stocking rate needs to be determined on site.

Adjustments to the initial stocking rates should be made as needed to obtain proper use. With specialized grazing systems, large livestock breeds, uncontrolled ungulates, inaccessibility, dormant season use, presence of introduced forage species, seeded rangeland etc., stocking rate adjustments will be required.

Habitat for Wildlife:
This site provides habitat which supports a resident animal community that is characterized by pronghorn, deer, cottontail, jackrabbit, coyote and various raptors. There is seasonal use by upland game birds.

Recreational uses

This site has medium value regarding recreational uses and natural beauty. Pronghorn hunting provides fair to good recreation on the site. The numerous forbs that bloom from spring to mid-summer give this site an aesthetically pleasing appearance.

Wood products

None

Inventory data references

Location of Typical Example of this site:
Rocky Flats between Golden and Boulder.

This site occurs in the following counties: Arapahoe, Boulder, Douglas, Elbert, El Paso, Fremont, Huerfano, Jefferson, Larimer, Las Animas.

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Approval

Kirt Walstad, 4/09/2025

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--Site Development and Testing Plan--:

Future work to validate and further refine the information in this Provisional Ecological Site Description is necessary. This will include field activities to collect low-, medium-, and high-intensity sampling, soil correlations, and analysis of that data.

Additional information and data are required to refine the Plant Production and Annual Production tables for this ecological site. The extent of MLRA 49 must be further investigated.

Field testing of the information contained in this Provisional ESD is required. As this ESD is moved to the Approved ESD level, reviews from the technical team, quality control, quality assurance, and peers will be conducted.

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	04/09/2025
Approved by	Kirt Walstad

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

17. **Perennial plant reproductive capability:**