USDA Natural Resources Conservation Service

Ecological site R049XB204CO
Shallow 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

R049XB204CO Shallow Foothill occurs on ridges, hog-backs, and steep slopes. Slopes is between 0 to 35%. Soils are shallow (< 20 inches). Soils are derived from residuum from basalt, sandstone, shale, granite, gneiss and/or limestone; slope alluvium from basalt, sandstone and/or limestone. Soil surface texture is loam or sandy loam and it may have cobbles, stone, gravels or channers in it. It is a Mountain Mahogany – Big Bluestem – Little Bluestem community. It has an aridic ustic moisture regime. The effective precipitation ranges from 13 to 17 inches.

Associated sites

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.
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 12to 16 inches.
R049XY036CO	**Overflow** This site occurs on flood plains, terraces, valley floor and stream terraces. Slopes is between 0 to 9%. Soils are greater than 60 inches in depth. Soils are derived from slopes alluvium from sandstone and shale. Soil surface texture is loam or fine sandy loam. Family particle size is fine-loamy. It is a Western Wheatgrass– Green Needlegrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 11 to 18 inches.
R049XB208CO	**Clayey Foothill** This site occurs on undulating hills to gently sloping uplands. Slopes is between 0 to 15%. Soils are moderately deep to deep (20 to 60 inches). Soils are derived from alluvium from basalt, and/or calcareous shale; or residuum from clayey shale, sandstone, calcareous shale and/or shale. Soil surface texture is clay loam or silty clay loam and it may or may not have cobbles, stone, or gravels (up to 15%). Family particle size is fine. It is a Western Wheatgrass – Green Needlegrass community. It has an aridic ustic moisture regime. The effective precipitation ranges from 12 to 17 inches.

Similar sites

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.
R049XE223CO	**Shrubby Foothill** This site occurs on hillsides and steep hills. Slopes is between 25 to 50%. Soils are shallow to moderately deep with depth of 8 to 40 inches. Soils are derived from slopes alluvium, and/or residuum primarily from shale and siltstone. Soil surface texture is channery silty clay loam or clay loam. Family particle size is clayey or fine. It is an Oak – Mountain Mahogany – Mountain Muhly – Western Wheatgrass community. It has a typic ustic moisture regime. The effective precipitation ranges from 16 to 22 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cercocarpus montanus*
Herbaceous	(1) *Andropogon gerardii* (2) *Schizachyrium scoparium*

Physiographic features

Topography is ridges, hog-backs, and steep slopes. Slope is often east facing but can be in any direction. Slope varies from nearly level to 35%. Elevation ranges from 5,500 to 7,000 ft.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Hogback (3) Hill (4) Scarp (5) Valley side (6) Lava plateau (7) Pediment
Runoff class	Medium to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,134 m
Slope	1–35%

Aspect	E

Climatic features

Precipitation averages 13 to 17 inches (35-43 cm) annually with fluctuations from year to year. From 65 to 70% of the precipitation is received between May and October.

Average annual temperature is approximately 49 degrees F (9.4 degrees C). Length of the frost-free period averages 120 to 150 days and occurs from the middle of May till the end of September. High intensity summer storms followed by hot dry periods are common.

Table 3. Representative climatic features

Frost-free period (characteristic range)	84-112 days
Freeze-free period (characteristic range)	114-136 days
Precipitation total (characteristic range)	356-432 mm
Frost-free period (actual range)	70-120 days
Freeze-free period (actual range)	105-150 days
Precipitation total (actual range)	330-432 mm
Frost-free period (average)	99 days
Freeze-free period (average)	125 days
Precipitation total (average)	381 mm

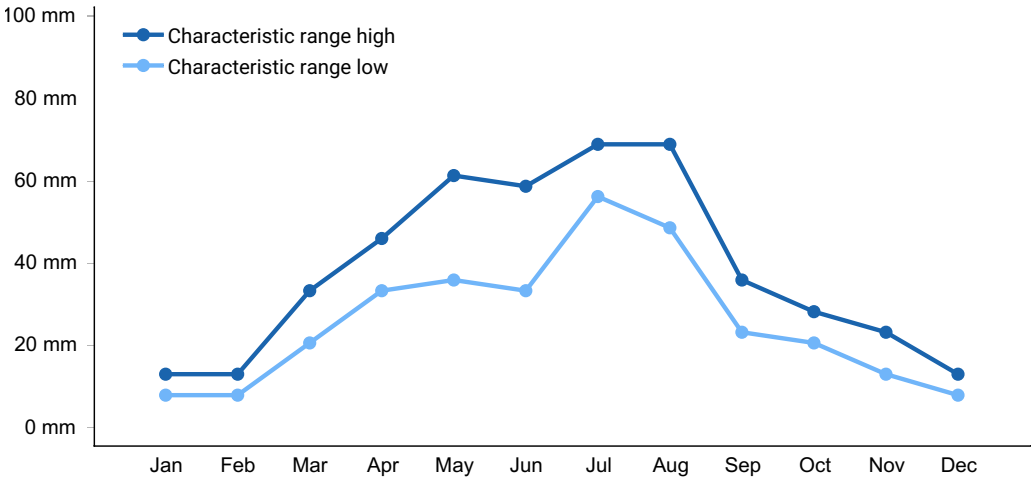


Figure 1. Monthly precipitation range

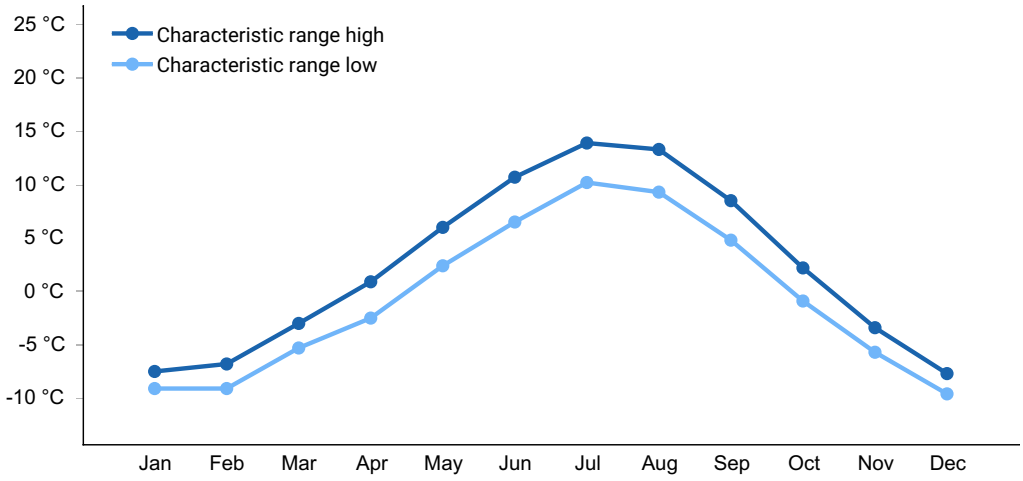


Figure 2. Monthly minimum temperature range

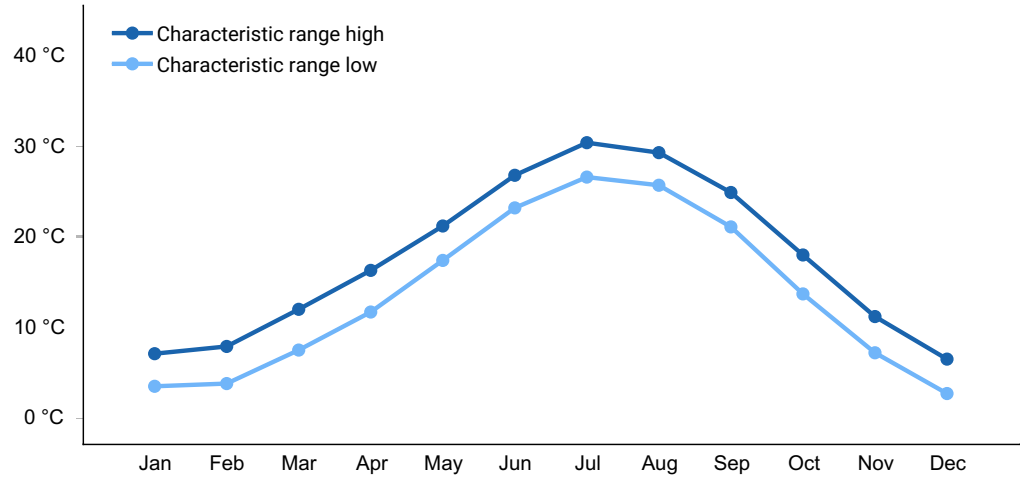


Figure 3. Monthly maximum temperature range

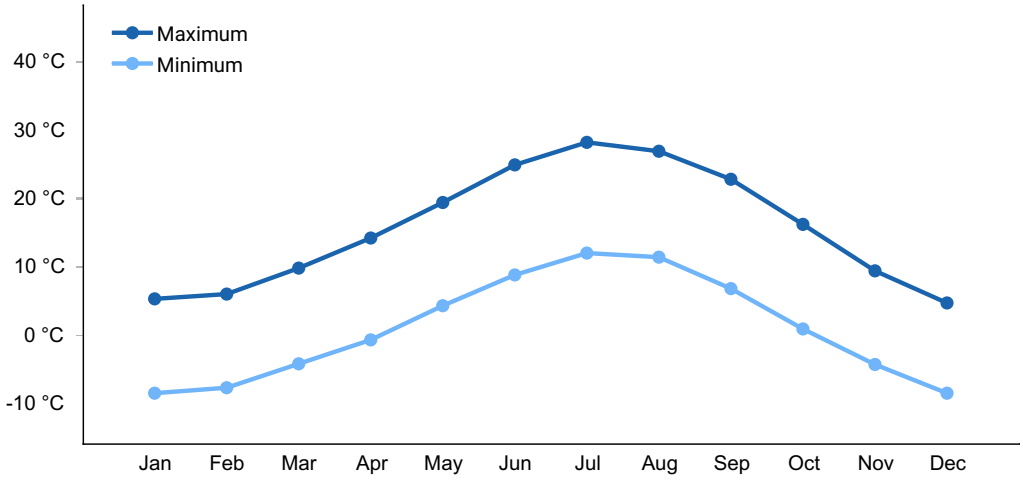


Figure 4. Monthly average minimum and maximum temperature

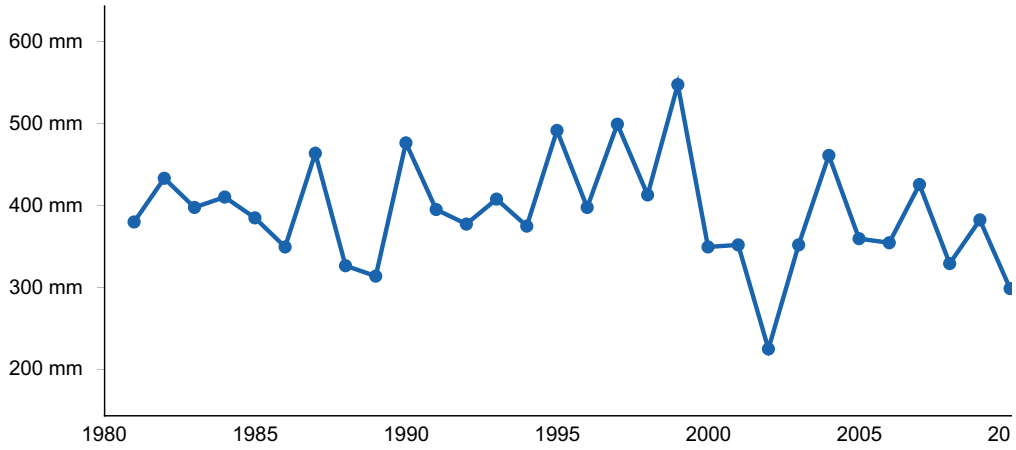


Figure 5. Annual precipitation pattern

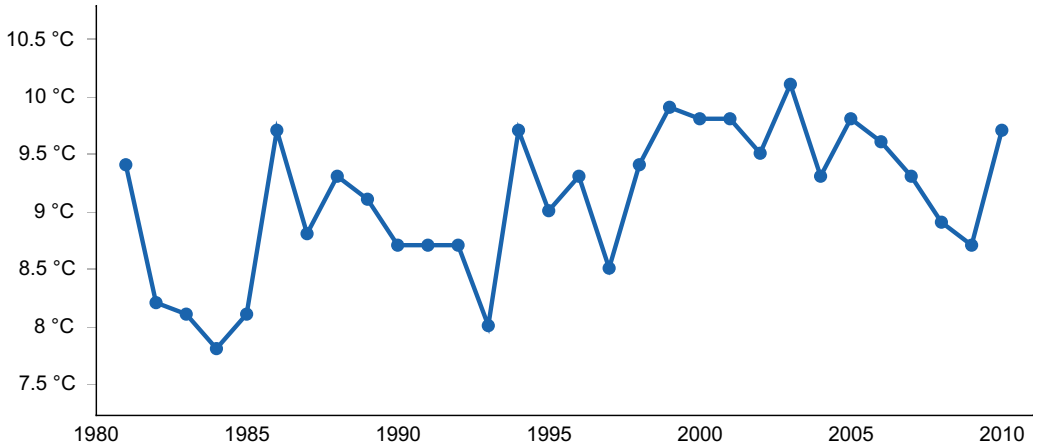


Figure 6. Annual average temperature pattern

Climate stations used

- (1) VIRGINIA DALE 7 ENE [USC00058690], Livermore, CO
- (2) WATERDALE [USC00058839], Loveland, CO
- (3) PARKER 6 E [USC00056326], Parker, CO
- (4) RUSH 1N [USC00057287], Rush, CO
- (5) COLORADO SPRINGS MUNI AP [USW00093037], Colorado Springs, CO
- (6) SHEEP MTN [USC00057572], Gardner, CO
- (7) RED WING 1 WSW [USC00056977], Gardner, CO

Influencing water features

None

Soil features

The soils of this site are shallow and well drained. They occur on upland ridges and formed primarily from basalt, sandstones and limestones. Surface texture can vary from a stony sandy loam to a loam.

Permeability is moderately slow to moderately rapid. Available water capacity is low. Runoff is medium to very high and erosion can be severe if plant cover is destroyed.

Major soils associated with this site are:
Apache cobbly loam, Baller stony sandy loam, Bernal sandy loam, Bond Loam, Corpening gravelly loam, Demayo very cobbly clay loam, Lanola channery loam, Laporte loam, Penrose channery loam, Purner fine sandy loam, and Rizozo loam

Table 4. Representative soil features

Parent material	(1) Residuum–basalt (2) Residuum–sandstone (3) Residuum–limestone (4) Residuum–granite and gneiss (5) Slope alluvium–basalt (6) Slope alluvium–limestone (7) Slope alluvium–sandstone (8) Residuum–limestone and shale
Surface texture	(1) Sandy loam (2) Cobbly, channery, gravelly loam (3) Fine sandy loam (4) Very cobbly clay loam (5) Loam (6) Stony sandy loam
Family particle size	(1) Loamy (2) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	10–51 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–15%
Available water capacity (Depth not specified)	1.78–6.6 cm
Calcium carbonate equivalent (Depth not specified)	0–15%
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)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

This site developed with occasional fires being part of the ecological processes. It is believed that the fires were historically infrequent, 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 (deliberately or accidentally). Both 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.

Drought and insects/disease cycles historically have had a major impact upon the vegetation. The species composition changes according to the duration and severity of the drought cycle. This site is extremely dynamic and variable due to variations in climate (precipitation and temperature), aspect, elevation, parent material, soils, fire frequency/intensity, past timber harvest, and grazing (wildlife and domestic). Typical vegetation patterns are a mosaic of grasses, shrubs, and trees.

Timber harvest for fuel and lumber has significantly influenced the appearance of the site today. Drought and/or early killing frost cycles have historically had a major impact upon the vegetation. Species composition changes according to the duration and severity of the drought and/or frost cycle.

Today, much of this site is urban/suburban residence and small acreage development. The natural variation and beauty of the site creates a desirable setting for homes. High value homes and real estate lead to fire suppression.

Continuous grazing without adequate recovery periods following each grazing occurrence will initially cause big bluestem, Indiangrass, little bluestem, switchgrass, sideoats grama, Montana (Griffith’s) wheatgrass, western wheatgrass, and purple prairie clover to decrease in frequency and production. Species such as blue grama, sand dropseed, threeawn, hairy false goldenaster, Gambel oak, mountain mahogany, and ponderosa pine will increase. Prescribed grazing with adequate recovery periods following each grazing event and proper stocking rates will maintain the herbaceous component of the community. Non-use and lack of fire initially causes increased herbaceous litter/needles. Decadence and lower vigor vegetation are expected.

Continuous browsing without adequate recovery periods will cause woody species such as mountain mahogany, serviceberry, and Gambel oak to decrease and herbaceous species to increase.

Long-term continuous grazing or long-term non-use, in the absence of fire, causes ponderosa pine to increase and eventually dominate the plant community. Severe/crown fire will shift a ponderosa pine dominated community to an increased Gambel oak/mountain mahogany community. Fire and continuous grazing applied to an oak/mahogany community will typically produce a Gambel oak dominated community. Oak dominated communities usually persist for 25 to 100 years. Prescribed grazing and proper stocking rate by browsing animals, in the absence of fire, can shift this community back to the Reference Plant Community or associated plant community.

Timber harvest or severe/crown fire with continuous grazing will shift the higher successional plant communities toward a shrub-dominated community. Long-term prescribed grazing and proper stocking rate with browsing animals, in the absence of fire, has the potential to bring a shrub-dominated plant community back to the reference or associated plant community.

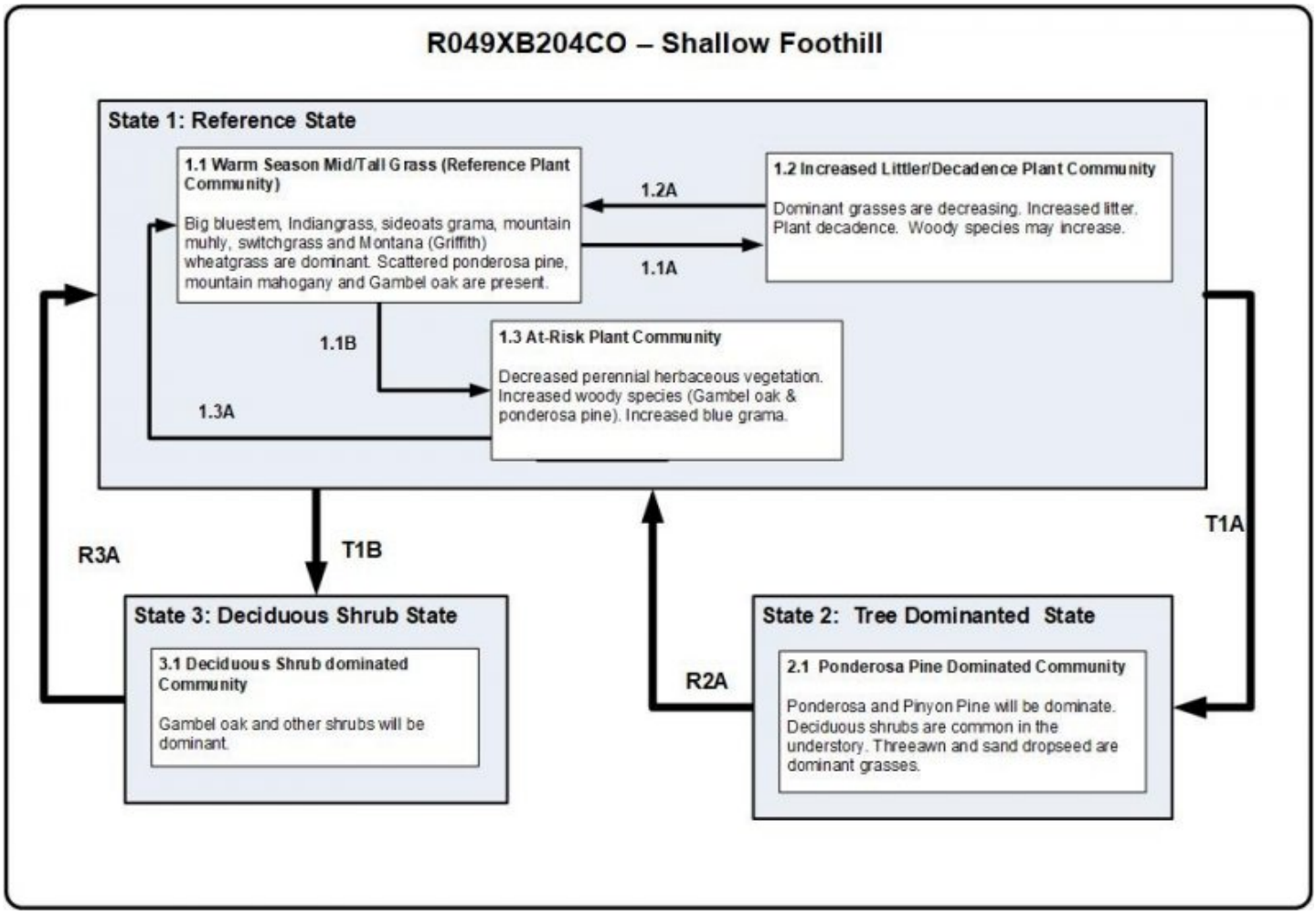
Long-term prescribed grazing (greater than 40 years) with proper stocking rate and selected timber harvest or fire will decrease ponderosa pine densities and invigorate herbaceous/shrub species.

The Reference Community has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal use pastures, prescribed grazing and historical accounts.

The following is a State and Transition Diagram that illustrates the states and the common plant communities that can occur on this ecological site. The pathways among communities are represented by fine-line arrows. Bold lines surrounding each state represent ecological thresholds. The bold-line arrows indicate transitions away from and restoration pathways back toward states across thresholds. The ecological processes will be discussed in more detail in the Community narrative descriptions following the diagram.

These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition table shown below has been developed from the best available knowledge at the time of this revision. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added to the model. None of these plant communities should necessarily be thought of as "Desired Plant Communities". Desired Plant Communities will be determined by the decision- makers and will meet the needs of the resources. 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 version of the Ecological Site Description.

State and transition model



Legend

1.1B – continuous grazing without adequate recovery time; reduced fire, drought
1.2A – proper grazing, fire, wetter climatic cycles
1.1A – lack of grazing, lack of fire, time without disturbance
1.3A – long term proper grazing, proper stocking rate, continuous browsing without recovery time, timber harvest
T1A – long term continuous grazing, long term non-use, lack of fire
T1B – long term continuous grazing, severe crown fire in Ponderosa, timber harvest
R3A – long term proper grazing (browsers), lack of fire
R2A – long term proper grazing, proper stocking rate, fire, timber harvest

State 1
Reference

Following is the narrative for the reference state and reference plant community. This plant community may not represent every possibility, but probably represents the most prevalent and repeatable plant community. The plant composition table has been developed from the best available knowledge at the time of this revision. As more data is collected, this plant community may be revised, and new ones may be added. This plant community should not 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. Characteristics and indicators. The Reference State is characterized by three distinct plant community phases. The Reference Plant Community, Increased Litter/Decadence Plant Community, and the At-Risk Plant Community represent the state. Warm season mid/tall grasses with scatted distributions of woody plants give the site a grassland/ shrubland/ savanna appearance on the landscape. The plant communities, and the various successional states between them, represent the natural range of variability due to the disturbance regimes applicable to the site.

Community 1.1
Reference Plant Community 1.1

Figure 7. Shallow Foothill, Reference Community, Douglas County, 7-20-2004

This plant community is the interpretive plant community for this site and is considered to be the Reference Plant Community. This community developed with grazing by large

herbivores and is suited to grazing by domestic livestock. Historically, fires likely occurred infrequently. This plant community is found on areas where grazed plants receive adequate periods of recovery during the growing season. The potential plant community is about 55 to 65% grasses, 10 to 15% forbs, and 15 to 20% shrubs and 3 to 5% trees. This site gives a browse type vegetation appearance. A mosaic of grass, shrub or tree dominated areas occur due to variations in parent material, fire history/patterns, climatic extremes, and grazing events. Dominant plants are big bluestem, little bluestem, sideoats grama, Indiangrass, switchgrass, Montana (Griffith) wheatgrass, purple prairie clover, mountain mahogany, and ponderosa pine. Secondary plants consist of blue grama, western wheatgrass, mountain muhly, elk and sun sedge, numerous forbs, Gambel oak, American plum, chokecherry, skunkbush sumac, currant. Twoneedle pinyon, oneseed and Rocky Mountain juniper, and ponderosa pine are also found in the reference community in small amounts. This is a sustainable plant community in terms of site stability, watershed function, and biological integrity. Litter is uniformly distributed where vegetative cover is continuous. Some litter movement may occur on steeper slopes. Decadence and natural plant mortality is low. The biotic community, nutrient cycle, water cycle and energy flow are functioning properly. Livestock and vehicle trails are subject to water erosion. If ecological retrogression is cattle-induced, plants such as big bluestem, Indiangrass, sideoats grama, mountain muhly, switchgrass, and Montana (Griffith) wheatgrass will decrease or disappear from the plant community. Many forbs and shrubs will increase. If retrogression is sheep induced mountain mahogany and many forbs will decrease and many grasses will increase. With further deterioration, cheatgrass, Japanese brome, and other annuals invade the site. Vegetation density (Vegetation density = basal area. This is the area of ground surface covered by the perennial stem or stems. Usually, this is measured one inch (2.54 cm) above the soil in contrast to the full spread of perennial foliage) is approximately 10%. Total Annual Production: If the range is near reference conditions, the approximate total annual production (air-dry) is: favorable years 1200 lbs/ac 1345 kg/ha normal years 800 lbs/ac 897 kg/ha unfavorable years 400 lbs/ac 448 kg/ha Of this production, 5 to 15% will likely be unpalatable to livestock.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	291	583	874
Forb	67	135	202
Shrub/Vine	67	135	202
Tree	22	45	67
Total	**447**	**898**	**1345**

Additional community tables

Table 6. Community 1.1 plant community composition

				Annual Production	Foliar

Group	Common Name	Symbol	Scientific Name	(Kg/Hectare)	Cover (%)
Grass/Grasslike					
1	**Grasses and Grasslike Plants**			448–729	
	big bluestem	ANGE	*Andropogon gerardii*	179–297	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	90–179	–
	little bluestem	SCSC	*Schizachyrium scoparium*	90–179	–
	Indiangrass	SONU2	*Sorghastrum nutans*	90–179	–
	mountain muhly	MUMO	*Muhlenbergia montana*	39–90	–
	needle and thread	HECO26	*Hesperostipa comata*	39–90	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	27–63	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	27–63	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	2–59	–
	blue grama	BOGR2	*Bouteloua gracilis*	2–50	–
	switchgrass	PAVI2	*Panicum virgatum*	0–50	–
	Sandberg bluegrass	POSE	*Poa secunda*	2–50	–
	Grass, perennial	2GP	*Grass, perennial*	2–50	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	2–39	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–30	–
	Scribner needlegrass	ACSC11	*Achnatherum scribneri*	0–30	–
Forb					
2	**Forbs**			84–168	
	Forb, perennial	2FP	*Forb, perennial*	2–50	–
	textile onion	ALTE	*Allium textile*	0–10	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–10	–
	spider milkweed	ASAS	*Asclepias asperula*	0–10	–
	Drummond's milkvetch	ASDR3	*Astragalus drummondii*	0–10	–
	white heath aster	SYERE	*Symphyotrichum ericoides var. ericoides*	0–10	–
	James' cryptantha	CRCIJ	*Cryptantha cinerea var. jamesii*	0–10	–
	Geyer's larkspur	DEGE2	*Delphinium geyeri*	0–10	–

	twolobe larkspur	DENU2	*Delphinium nuttallianum*	0–10	–
	winged buckwheat	ERAL4	*Eriogonum alatum*	0–10	–
	shaggy fleabane	ERPU2	*Erigeron pumilus*	0–10	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0–10	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–10	–
	Lewis flax	LILE3	*Linum lewisii*	0–10	–
	dotted blazing star	LIPU	*Liatris punctata*	0–10	–
	Nebraska lupine	LUPL	*Lupinus plattensis*	0–10	–
	crownleaf evening primrose	OECO2	*Oenothera coronopifolia*	0–10	–
	New Mexico groundsel	PANEM	*Packera neomexicana var. mutabilis*	0–10	–
	upright blue beardtongue	PEVI4	*Penstemon virgatus*	0–10	–
Shrub/Vine					
3	**Shrubs**			84–168	
	alderleaf mountain mahogany	CEMO2	*Cercocarpus montanus*	129–230	–
	Gambel oak	QUGA	*Quercus gambelii*	45–90	–
	skunkbush sumac	RHTR	*Rhus trilobata*	2–30	–
	wax currant	RICE	*Ribes cereum*	2–22	–
	chokecherry	PRVI	*Prunus virginiana*	2–22	–
	prairie sagewort	ARFR4	*Artemisia frigida*	2–22	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	2–22	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	10–22	–
Tree					
4	**Trees**			6–67	
	twoneedle pinyon	PIED	*Pinus edulis*	49–100	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	29–69	–
	oneseed juniper	JUMO	*Juniperus monosperma*	19–49	–
	ponderosa pine	PIPO	*Pinus ponderosa*	2–10	–

Animal community

Grazing Interpretations:
This site provides good forage for cattle and horses throughout the year. It provides excellent forage for sheep, deer, and pronghorn. Distribution of domestic livestock can be a problem on this site due to the slopes, shrubs, and rocks. Cattle in particular and all domestic livestock in general tend to graze the lower slopes, leaving the upper slopes lightly grazed or ungrazed. Cattle poisoning in the spring and early summer can be a problem if the area has a larger than normal amount of larkspur. Larkspur seems to increase in abundance with overuse of the site.

The animal forage preference changes as the growing season progresses. Montana (Griffith) wheatgrass, needleandthread, and several other cool season grasses provide good spring and early summer grazing. Big bluestem, yellow Indiangrass, sideoats grama, little bluestem, and several other warm season plants provide good summer forage. Alderleaf mountain mahogany provides good browse through the fall and winter. It is important that a proper stocking rate and planned deferment be scheduled so these plants are not grazed out. Reestablishment of vegetation is difficult on this site due to the slope, rocks, and shallow soil. The season of use, climate, kind of grazing animal, past grazing use, and plant composition will directly influence animal preference and performance.

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 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/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% 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)
Warm Season Mid/Tall Grass PC/ 800/ 0.22
Increased Litter/Decadence PC/ 400/ 0.11
At Risk PC/ 600/ 0.16
Ponderosa Pine Dominated PC/ */ *

Deciduous Shrub Dominated PC/ */ *
* Highly variable; stocking rate needs to be determined on site.

Wildlife:
This site has a high value for deer and moderate value for cottontail, coyote, pronghorn, and various raptors

Plants That May Cause Poisoning to Livestock:

Common Name - Scientific Name - Season Dangerous - Animals Affected

Geyer larkspur (Delphinium geyeri) and Nuttall larkspur (Delphinium nuttallianum) - Spring and early summer when other green forage is not available - Cattle are most susceptible; horses and sheep occasionally affected

Effect and symptoms - Poisoning is cumulative. Symptoms include loss of appetite, general uneasiness, excessive salivation, frequent swallowing, twitching muscles, rapid irregular heartbeat, respiratory paralysis, and staggering gait. In advanced cases the animal falls and lies with feet extended more or less rigidly. Poisoned animals are constipated, and severe cases are nauseated, and some are also bloated.

Common chokecherry (Prunus virginiana) - spring and early summer when leaves contain a large amount of toxin during periods of short forage, freezing weather - sheep-cattle

Effects and symptoms - The plants contain cyanogenetic glycoside which bacteria and enzymes converts to a hydrocyanic (prussic) acid. A lethal dose will occur when the animal consumes .25% of the body weight. The poison is not cumulative, and animals will recover. The release of the toxin is related to consumption of water which prompts rapid release of the toxin.

Illness may begin within five minutes after plant is eaten. Death occurs within 15 minutes. Extreme salivation, labored breathing, muscle tremors, in-coordination, bloating, convulsions, and death due to respiratory failure. Blood will appear bright red and lungs will be congested. Remove affected animals from area and treat with sodium nitrate and sodium thiosalfate intravenously. Unaffected animals should also be removed.

Illness may begin within five minutes after plant is eaten. Death occurs within 15 minutes. Extreme salivation, labored breathing, muscle tremors, in-coordination, bloating, convulsions, and death due to respiratory failure. Blood will appear bright red and lungs will be congested. Remove affected animals from area and treat with sodium nitrate and sodium thiosalfate intravenously. Unaffected animals should also be removed.

Drummond milkvetch (Astragalus drummondii) - Drummond milkvetch has not been confirmed as being poisonous to livestock. However, it is listed as being suspected of toxicity. - Potentially cattle, horses and sheep.

Variable Senecio (Senecio mutabilis) - when palatable forage is scarce - mostly cattle and horses; usually not affected if fed on supplement during the dry range conditions in the spring

Effect and symptoms - Symptoms are progressive and effects are cumulative. Weakness, diarrhea, and darkly stained urine may be observed. Animals die quickly or wander aimlessly. Adequate feed or supplement during the spring will reduce the hazard.

Hydrological functions

Soils of this site are grouped into "D" and "C" hydrologic groups as outlined in the "Soils of Colorado Loss Factors and Erodibility Hydrologic Groupings 1979" handbook. Field investigations are needed to determine hydrologic cover and curve numbers. The hydrologic curve number for group D soils is about 80 and group C soils is about 74, where the hydrologic conditions are good, as shown in "Peak Flows in Colorado" handbook.

Refer to SCS National Engineering Handbook, Section 4, to determine runoff quantities from the curves.

Recreational uses

Due to the break in physiographic features, the site has a high aesthetic appeal and natural beauty. It is fair to good for hiking and excellent for deer hunting.

Other information

Threatened and Endangered Plants and Animals:
Gaura neomexicana coloradoensis or Colorado butterfly weed has been reported as endangered in Boulder, Douglas, Jefferson, Larimer, and Weld counties. However, its occurrence on this ecological site has not been proven.

The buffalo (bison) are gone, except for a few commercial herds.

The black-footed ferret may have been associated with this site or adjacent sites.

Inventory data references

Location of Typical Examples of the Site:
a. Weaver Ranch, N of Laporte, Larimer Co.
b. East face of first Hogback, W. of Lakewood, Jefferson, Co.
c. Brittingham Ranch, Agate SCD, 12 miles north of Ramah.

Counties in which this ecological site occurs:

Arapahoe, Boulder, Custer, Douglas, Elbert, El Paso, Fremont, Huerfano, Jefferson, Larimer, and Las Animas.

Other references

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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):

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

    Dominant:

    Sub-dominant:

    Other:

    Additional:

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

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

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

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

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17. **Perennial plant reproductive capability:**
