USDA Natural Resources
Conservation Service

Ecological site GX070A01X003
Loamy Uplands

Last updated: 10/01/2021
Accessed: 05/20/2024

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): 070A–High Plateaus of the Southwestern Great Plains

This site is only applicable to the Canadian Plateaus LRU of MLRA 70A (LRU 70A.1).

LRU notes

This site is only applicable to the Canadian Plateaus LRU of MLRA 70A (LRU 70A.1). Please refer to the following key:

Land Resource Unit (LRU) Key for MLRA 70A
– High Plateaus of the Southwestern Great Plains
1a. The site exists on a landform of volcanic origin, such as a basalt plateau, or is part of an escarpment system that rises directly to a volcanic structure. These escarpments are included if they have volcanic alluvium or colluvium (i.e. basalt, rhyolite, tuff, cinders) overlying non-volcanic residuum or bedrock (i.e. sandstone, shale). → VOLCANIC PLATEAUS LRU (VP)
User tip: Other alluvial or colluvial landform features extending below the escarpments are not included unless they have a predominance of volcanic fragments at the surface. Also, note that playas atop volcanic plateaus are included within the VP-LRU.
1b. All other sites. → 2
2a. The site exists in the annulus or floor of a playa. → CANADIAN PLATEAUS LRU (CP)
User tip: Small islands of playas occur within large areas of HP-LRU. These sites may be far from the nearest CP landform but will still key-out to the CP-LRU. The playa rim components, however, may key out to either LRU, so it is important to properly identify their soil properties.
2b All other sites. → 3
3a. The site is part of an escarpment landscape complex (defined below) or is within a canyon, valley, or small basin confined by such escarpments. At the upper boundary of the LRU, the soil surface meets at least 4 of the following 5 criteria:
I. Shallow or very shallow soils are present in at least 50% of the landform area;
II. Soils are underlain by sandstone bedrock of the Cretaceous Dakota Formation or older;
III. Presence or historical evidence of a conifer stand (≥ 2% canopy cover);
IV. The ground surface has a slope of at least 10%;
V. The landforms drain towards steep-walled escarpments or canyons below the Dakota sandstone (older Jurassic and Triassic Formations underlie this sandstone mesa cap).
→ MESOZOIC CANYONS AND BREAKS LRU (MCB)
User tip: The MCB sites also occur on any colluvial or alluvial bottomlands confined within escarpments or canyons. Some valleys transition from CP to MCB, or back to CP, and the turning point can be difficult to determine. Generally, the landforms are part of the MCB when confined between Dakota sandstone breaks or escarpments on both sides. Much of the acreage in the MCB is aproned by colluvial debris fans—composed of sandy materials with large sandstone fragments visible on the soil surface, including large stones or boulders. The soils in the bottoms of these confined valleys will also be in the MCB. When the valley opens, or there is only a single escarpment opening

to the plains, the landforms below the steeper, rockier escarpments will be members of the CP-LRU.
3b. Fewer than 4 of the above criteria are met. → 4
4a. The soil is on a plateau summit position (tread) and is within 50 cm to contact with either plateau bedrock (non-soil bedrock of cemented sandstone, limestone, or shale) or strath terrace cobbles, but not a petrocalcic contact (caprock or caliche of cemented calcium carbonate). → CANADIAN PLATEAUS LRU (CP)
4b. No plateau bedrock or strath terrace cobbles within 50 cm. → 5
5a. Fragments (>2 mm) are visible within the soil profile and/or on the surface. If fragments cannot be found in the profile, it is acceptable to look nearby on ant mounds or around burrows. If site is in a drainageway, one can look for fragments on landforms immediately upslope.→ 6
5b. Fragments are entirely absent. → 7
6a. Fragments are mostly petronodes3 or High Plains gravels. → HIGH PLAINS LRU (HP)
6b. Fragments are mostly plateau bedrock fragments. → CANADIAN PLATEAUS LRU
7a. All horizons in the upper 100 cm of soil have textures of sandy clay loam or sandier.
→ CANADIAN PLATEAUS LRU (CP)
7b. At least one horizon in the upper 100 cm of soil has a texture that is less sandy than sandy clay loam. → HIGH PLAINS LRU (HP)

Classification relationships

NRCS and BLM: Loamy Uplands Canadian Plateaus LRU Major Land Resource Area 70A, High Plateaus of the Southwestern Great Plains Land Resource Region G, Western Great Plains Range and Irrigated Region (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS: Loamy Uplands Sandy Smooth High Plains Subsection Southern High Plains Section Great Plains-Palouse Dry Steppe Province (Cleland, et al., 2007).

EPA: Loamy Uplands <26l Upper Canadian Plateau<26 Southwestern Tablelands (Griffith, et al., 2006).

Ecological site concept

The Loamy Uplands ecological site occurs on plateau summits in the Canadian Plateaus LRU. This LRU occupies the western portion of MLRA 70A and extends from Las Vegas, NM at the southern end to beyond Raton, NM at its northern end. Elevation for the Canadian Plateaus LRU ranges from 5,000 to 7,500 feet.

Surface texture ranges from loam to silt loam to clay loam. The central concept for this site is a soil at least 20 inches (50 centimeters [cm]) thick, with loamy textures (clay content roughly below 35 percent). Typically, these soils exhibit either a lithic contact to Dakota sandstone or paralithic contact with weathered Cretaceous shale within 60 inches (150 cm) of depth. It is differentiated from its most common associated site, the Clayey Uplands, which has surface textures of clay loam or finer (roughly exceeding 35 percent clay within 20 inches [50 cm] depth).

Associated sites

GX070A01X019	**Gravelly Terraces** This site occurs on old stream terraces. Soils are skeletal, and contain well-developed argillic horizons. Gravelly Terrace sites typically occur below Loamy sites.
GX070A01X021	**Sandy** This site occurs in soils that are ≥ 20 inches (50 cm) to a root restrictive layer and have surface textures of sandy loam or coarser. Such sites typically occur on sand sheets and dunes adjacent to playas.
GX070A01X013	**Lithic Sandstone** This site occurs where soils are ≤ 20 inches (50 cm) to lithic contact with sandstone bedrock, and often supports oneseed juniper savannas.
GX070A01X006	**Slopes** This site occurs on escarpments where soils are ≤ 20 inches (50 cm) to a root-restrictive layer, and have slopes > 10%.
GX070A01X008	**Ephemeral Drainageways** This site occurs on the channels and floodplains of ephemeral streams. Adjacent Loamy Uplands sites contribute water to this site via run-on and through-flow.

GX070A01X017	**Playas** This site occurs in playas. Loamy sites often provide water to adjacent Playa sites via through-flow and run-on.
GX070A01X012	**Low Terraces** This site occurs on terraces above perennial streams where the flooding frequency interval is ≥ 10 years. This site is often used for hay and small grain production. Adjacent Loamy Uplands sites contribute water to this site via run-on and through-flow.

Similar sites

R070AY001NM	**Loamy Upland** The Loamy Uplands ecological site fits many components that are currently correlated to the legacy Loamy Upland (R070AY001NM) sites. This site has loamy or coarser textures at the surface.
R070AY002NM	**Clayey Upland** The Loamy Uplands ecological site fits a few sites that are correlated to the Clayey Upland (R070AY002NM) site. This site has clay loam or finer textures at the surface.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Legacy ID

R070AA003NM

Physiographic features

The Canadian Plateaus LRU exists on a plateau unit of the Great Plains Province landscape. The landforms that occur on this landscape include both erosional and depositional surfaces of plateaus and consist of: alluvial fans, ridges, benches, playas, breaks, terraces, and floodplains. The Canadian River Valley, primarily to the east, is the base level towards which much of the LRU is eroding and draining. As the plateau grades towards the Canadian River, the elevation drops from heights as much as 7,500 feet to below 5,000 feet over a distance ranging from 20 to 40 miles. Because of this erosional gradient, the exposed strata are generally older as you move from west to east across this LRU. In the west younger bedrock, such as the late Cretaceous shales and limestones, remain intact, a testament to their distance from the Canadian River Valley. To the east, the early Cretaceous Dakota sandstone serves as a caprock that forms the plateau rim.

The transitional nature of the landform on which this site is located explains the lack of diagnostic horizons present in most profiles. This can be due to erosion, deposition, or both. Either way, the soil is prevented from developing features such as clay or secondary carbonate accumulation in the subsoil. The Loamy Uplands site is not very extensive, and is not the only ecological site that occurs on plateau summits in the Canadian Plateaus LRU. Other ecological sites that occupy this landform position are the Clayey Uplands, Limy, Lithic Sandstone, Lithic Limestone, Sandy, and Shallow Loamy.

Associated sites that occur on landforms and landform positions adjacent to the Loamy Uplands site are the Clayey Uplands, Playas, Ephemeral Drainageways, Low Terraces, Slopes, Limy, Limy Escarpments, and Gravelly Terraces.

Where the Loamy Uplands site grades into steep escarpments that are capped with Dakota sandstone, have historically supported stands of pinyon and juniper, and drain into canyons; the landscape transitions into the Mesozoic Canyons and Breaks LRU of MLRA 70A.

For more detail on how the Loamy Uplands site contrasts with and relates to other sites in the Canadian Plateaus, see the Ecological Site Key and Associated Sites section below.

Geology:
The geology of the CP consists primarily of Cretaceous rocks: shale, limestone and sandstone of the Dakota, Graneros, Greenhorn, Pierre, and Niobrara Formations. Being widely distributed across this LRU, the Loamy Uplands site occurs on each of these formations. Soils typically form either in thick loess deposits or in loess over Dakota sandstone. Limestone is generally not a major parent material, as this site has neither strong effervescence nor calcareous fragments at the surface.

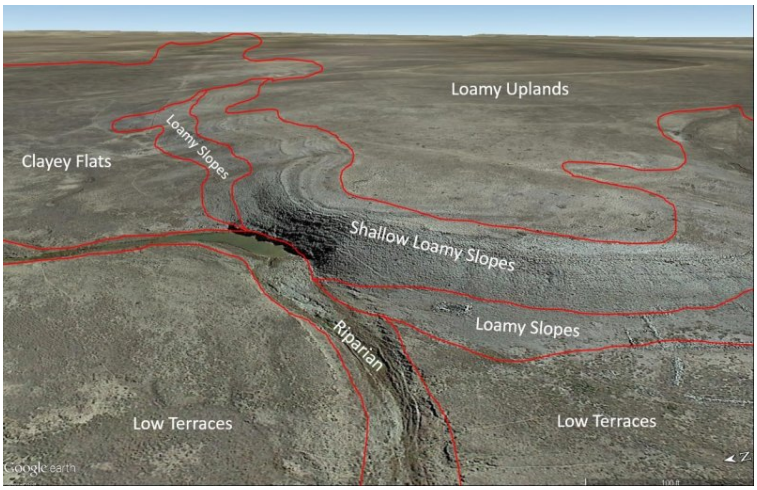


Figure 1. A landscape diagram showing the Loamy Uplands site in relation to some commonly-associated sites.

Table 2. Representative physiographic features

Landforms	(1) Plateaus or tablelands > Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	1,524–2,286 m
Slope	0–10%
Water table depth	203–251 cm
Aspect	Aspect is not a significant factor

Climatic features

The Canadian Plateaus are currently described as having an aridic-ustic and mesic soil climate regime. The estimated average annual soil temperature ranges from 49 to 58 F, supported by soil temperature measurements taken from May 2014 to July 2015. Rainfall occurs mostly during the summer months and ranges from 15 to 18 inches annually. An annual average range of 130 to 170 cumulative frost free days is common, with 150 days or fewer occurring above 7,000 feet.

Table 3. Representative climatic features

Frost-free period (characteristic range)	130-170 days
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	381-457 mm
Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	406 mm

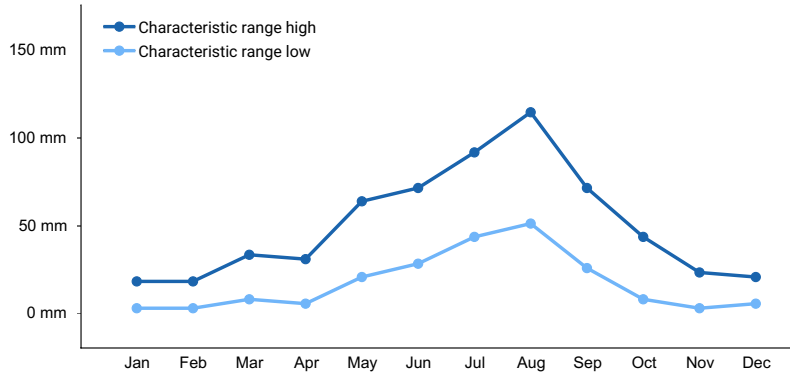


Figure 2. Monthly precipitation range

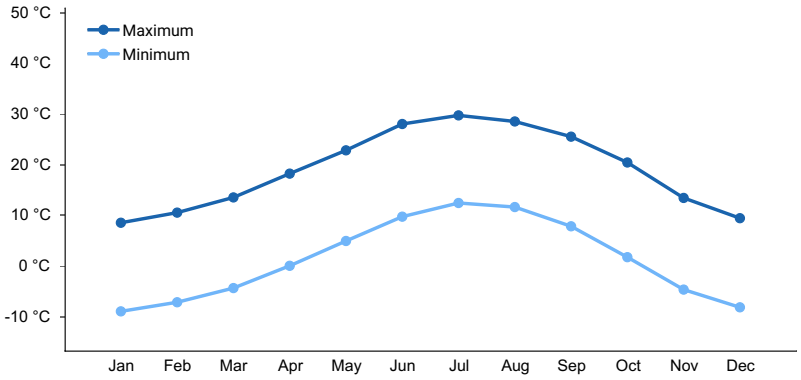


Figure 3. Monthly average minimum and maximum temperature

Climate stations used

- (1) SPRINGER [USC00298501], Springer, NM
- (2) CIMARRON 4 SW [USC00291813], Cimarron, NM
- (3) VALMORA [USC00299330], Valmora, NM
- (4) MAXWELL 3 NW [USC00295490], Maxwell, NM
- (5) DES MOINES [USC00292453], Des Moines, NM
- (6) LAS VEGAS WWTP [USC00294862], Las Vegas, NM
- (7) ROY [USC00297638], Roy, NM
- (8) LAS VEGAS MUNI AP [USW00023054], Las Vegas, NM

Influencing water features

The Loamy Uplands ecological site is not associated with a wetland or riparian system; it is an upland ecological site. Because this site occurs on linear or convex portions of plateau summits, it tends to shed water (via through-flow or run-off) to sites lower in the catena.

Soil features

Every ecological site and associated soil component has static soil properties that help define the physical, chemical, and biological characteristics that make the site unique. The following soil profile information is a description of those unique soil properties for the Loamy Uplands ecological site. To learn about the dynamic properties of the soil components tied to this site, refer to the Ecological Dynamics section of this ESD.

The Loamy Uplands ecological site is tied to the components of numerous map units in the Canadian Plateaus LRU of 70A. These components are tied to the following soil series: Colmor and Schomberg. These soils typically form in loess or alluvium over residuum derived from some mix of sandstone and shale and eolian or alluvial inputs.

In normal years these soils are driest during the winter. They are dry in some or all parts for over 90 cumulative days, but are moist in some or all parts for either 180 cumulative days or 90 consecutive days, during the growing season. The soil moisture regime is ustic bordering on aridic. The mean annual soil temperature is 49 to 55 degrees

F; this range falls in the mesic temperature regime.

The B horizons typically have between 18 and 35 percent clay, have low EC values throughout. While these soils typically have some secondary carbonates in the profile, they do not have combination of both strong effervescence and calcareous fragments at the surface. While these soils can be as shallow as 20 inches (50 cm) to root-restrictive layers, they are generally very deep.

TYPICAL PEDON: Colmor silt loam, from Colfax County manuscript NM007. Located 50 feet west and 3,630 feet south of the NE corner sec. 25, T.26N, R.24E. UTM location: 13S 559947 E., 4034644 N.

A-0 to 4 inches (0 to 10 cm); grayish brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, friable, slightly sticky, slightly plastic; many fine and very fine roots; common fine pores; calcareous; slightly alkaline; clear smooth boundary.

AB-4 to 14 inches (10 to 36 cm); grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; hard, friable, slightly sticky, slightly plastic; common fine roots; common medium tubular pores; calcareous; moderately alkaline; gradual smooth boundary.

Bk1-14 to 25 inches (36 to 64 cm); pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine roots; common medium tubular pores; calcareous; moderately alkaline; gradual smooth boundary.

Bk2-25 to 32 inches (64 to 81 cm); light yellowish brown (10YR 6/4) silty clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; calcareous with lime segregated into few fine, irregular, soft masses; moderately alkaline; gradual smooth boundary.

Ck1-32 to 52 inches (81 to 132 cm); very pale brown (10YR 8/4) silt loam, light yellowish brown (10YR 6/4) moist; massive; hard, friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; calcareous with lime disseminated; moderately alkaline; gradual smooth boundary.

Ck2-52 to 64 inches (132 to 163 cm); very pale brown (10YR 8/3) silty clay loam, brown (10YR 5/3) moist; massive; hard, firm, slightly sticky, plastic; few fine roots; few very fine vesicular pores; calcareous, with lime disseminated; moderately alkaline.

Parent Material Kind: Loess, Sandstone, Shale
Parent Material Origin: Eolian, alluvium, and residuum
Surface Texture Group: silt loam, loam, clay loam, sandy loam
Subsurface Texture Group: clay loam, silt loam, silty clay loam, loam

Table 4. Representative soil features

Parent material	(1) Eolian deposits–sandstone and shale (2) Residuum–sandstone and shale
Surface texture	(1) Silt loam (2) Loam (3) Clay loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	64–508 cm
Surface fragment cover <=3"	0–10%
Available water capacity (0-152.4cm)	25.4–35.56 cm

Calcium carbonate equivalent (0-152.4cm)	0–30%
Electrical conductivity (0-152.4cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-152.4cm)	0–2
Soil reaction (1:1 water) (0-152.4cm)	6.6–8.6
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

The Loamy Uplands ecological site contains a mix of grasses, forbs, shrubs, succulents; and, occasionally, trees. Late-seral communities are grasslands with scattered shrubs, while early-seral communities are dominated by shrubs or weedy forbs. While warm-season plants dominate this site, the relative abundance of cool-season plants increases in response to moisture in the spring and late fall.

There are numerous variables such as elevation, latitude, hydrology, soil depth, fire frequency, grazing dynamics, and anthropogenic effects that influence plant communities. This site is dominated by warm-season plants. Elevation generally increases as the plateaus gently climb to the west, and proximity to greater warm season moisture from the Gulf of Mexico increases toward the east. Thus, both of these factors result in an increase in the relative amount of warm-season moisture to the east. As elevation increases toward its upper extreme (about 7,500 feet) near the foot of the Rocky Mountains, cool-season plants become most abundant within this site. Therefore, blue grama and broom snakeweed are particularly abundant in the east; while western wheatgrass, fringed sage, and common sagewort increase in abundance as one travels west.

Since the Canadian Plateaus LRU is bounded by areas with strongly-contrasting geology and geomorphology, the Loamy Uplands site does not transition smoothly into adjacent ecological sites of other LRU's at its upper and lower elevations. Rather, the landscape transitions at the upper end into the Rocky Mountain Province (MLRA's 49 and 48A) or the Volcanic Plateaus LRU of MLRA 70A, and at the lower end to the Mesozoic Canyons and Breaks LRU of 70A.

While the Loamy Uplands site occupies rather subdued geomorphic positions, even gentle undulations cause certain landform positions to receive run-on moisture from adjacent positions. While major run-on-landforms such as alluvial flats and flood plains are covered by unique ecological sites, swales and small toeslopes are included within the concept of the Loamy Uplands site. In these positions, we find higher total production, and a greater relative abundance of grasses such as vine mesquite.

The Loamy Upland site does occur above Dakota Sandstone bedrock in locations, so long as contact with lithic sandstone occurs below 20 inches (50 cm). Where the soil depth to a restrictive sandstone layer approaches 20 inches (50 cm), a transition occurs to the Lithic Sandstone ecological site. Along this gradient, shrubs generally increase in abundance and trees such as oneseed juniper and twoneedle pinyon often appear, as do sideoats grama and little bluestem.

Within this site, the dominant species of short grasses are inherently drought- and grazing-tolerant (Lauenroth, 1994). Across the western parts of the U.S., blue grama is one of the most extensively distributed grasses and occurs in a wide variety of different ecosites ranging from grasslands to shrubland and woodland sites. This grass evolved with grazing by large herbivores and, when grazed continuously, tends to form a short sod. When allowed to grow under lower grazing pressures, the plants develop the upright physiognomy of a bunchgrass. If blue grama is eliminated from an area by extended drought (3-4 years) or disturbance such as plowing, regeneration is slow because of very slow tillering rates (Samuel, 1985), low and variable seed production, minimal seed storage in the soil (Coffin, 1989) and limited seedling germination and establishment due to particular temperature and extended soil moisture requirements for successful seedling establishment (Hyder, 1971) (Briske, 1978). Buffalograss, which

is more abundant at warmer, lower elevations of this site, is often found occupying swale or depression positions across the landscape. Buffalograss is less drought-tolerant than blue grama but re-establishes more quickly following disturbance due to higher seed abundance and viability and more effective above-ground tillering (Peters, 2008).

Large-scale processes such as climate, fire, and grazing influence this site. During years with favorable growing seasons, the effects of grazing may be mitigated. During years of low precipitation, grazing can magnify degradation of the site (Milchunas, 1989). Fire is a natural disturbance regime that suppresses succulents and shrubs while stimulating grasses and forbs, however, in contrast to mid and tall grass prairie sites, fire is less important (Wright, 1982). This is because the drier conditions produce less vegetation/fuel load, lowering the relative fire frequency. However, historically, fires that did occur were often very expansive, especially after a series of years where above average precipitation built enough litter/fine fuels. Currently, fire suppression and more extensive grazing in the region have decreased the fire frequency, and it is unlikely that these processes could occur at a natural scale (USNVC, 2017)-G144. According to (Gebow, 2001), fire effects in the same location will vary, especially with fire timing, where seasonality can either hinder or benefit plants depending on their growing stage. Precipitation events occurring before and after fire will also influence the recovery of plants. Fire promotes rhizomatous plant species, such as western wheatgrass, that can take advantage of below-ground rhizomes from which tillering is rapidly initiated.

Correlation to Current Ecological Sites:
This Loamy Uplands ecological site fits many components that are currently correlated to the legacy Loamy Upland (R070AY001NM) sites.

Annual production by plant type
Plant Type-------Low(Lb/Acre) -------RV(Lb/Acre)-------High(Lb/Acre)
Grass/Grasslike -------610----------860----------1100
Forb----------130----------130----------140
Shrub/Vine----------130----------130----------130
Total----------870----------1120----------1370

Community 1.1 plant community composition
Common Name----------Symbol-------Scientific Name-------Annual Production (Lb/Acre)
GRASS/GRASSLIKE
1-------blue grama----------BOGR2-------*Bouteloua gracilis*---------312–357
2-------western wheatgrass----PASM-------*Pascopyrum smithii*-------178–223
3-------squirreltail----------ELEL5-------*Elymus elymoides*---------89–133
4-------James' galleta----------PLJA-------*Pleuraphis jamesii*----------43–89
5-------sideoats grama----------BOCU-------*Bouteloua curtipendula*---43–89
6-------threeawn----------ARIST-------Aristida----------25–44
7-------ring muhly----------MUTO2------*Muhlenbergia torreyi*-----25–44
8-------buffalograss----------BODA2------*Bouteloua dactyloides*-----25–44
9-------common wolfstail--------LYPH---------*Lycurus phleoides*----------25–44
10-------sand dropseed----------SPCR---------*Sporobolus cryptandrus*----25–44
FORB
12-------*Forb, annual*----------2FA---------- *Forb, annual*----------10–48
13-------*Forb, perennial*----------2FP---------- *Forb, perennial*----------10–48
14-------Cuman ragweed----------AMPS---------*Ambrosia psilostachya*------10–25
15-------scurfpea----------CULLE---------Cullen----------5–25
16-------prairie clover----------DALEA-------Dalea----------5–25
17-------dotted blazing star---------LIPU----------*Liatris punctata*----------5–25
18-------locoweed----------OXYTR-------Oxytropis----------5–25
19-------upright prairie coneflower-RACO3------*Ratibida columnifera*-------5–25
20-------scarlet globemallow--------SPCO--------*Sphaeralcea coccinea*-------5–25
SHRUB/VINE
21-------winterfat----------KRLA2-------*Krascheninnikovia lanata*---29–48
22-------prairie sagewort----------ARFR4-------*Artemisia frigida*----------29–48
23-------*Shrub, deciduous*----------2SD---------- *Shrub, deciduous*----------29–48

This site also correlates with a few components that fit the legacy Clayey Upland (R070AY002NM) site.

Annual production by plant type

Plant Type	Low (Lb/Acre)	RV (Lb/Acre)	High(Lb/Acre)
Grass/Grasslike	330	660	1000
Shrub/Vine	30	60	100
Forb	10	20	40
Total	370	740	1140

Community 1.1 plant community composition

Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)
GRASS/GRASSLIKE			
1 blue grama	BOGR2	*Bouteloua gracilis*	200–240
2 western wheatgrass	PASM	*Pascopyrum smithii*	160–200
3 alkali sacaton	SPAI	*Sporobolus airoides*	160–200
4 James' galleta	PLJA	*Pleuraphis jamesii*	80–120
5 vine mesquite	PAOB	*Panicum obtusum*	40–80
6 sideoats grama	BOCU	*Bouteloua curtipendula*	8–40
7 buffalograss	BODA2	*Bouteloua dactyloides*	8–40
8 New Jersey muhly	MUTO	*Muhlenbergia torreyana*	8–40
FORB			
9 ragweed	AMBRO	Ambrosia	8–24
10 *Forb, perennial*	2FP	*Forb, perennial*	8–24
11 *Forb, annual*	2FA	*Forb, annual*	8–24
SHRUB/VINE			
12 fourwing saltbush	ATCA2	*Atriplex canescens*	16–48
13 pale desert-thorn	LYPA	*Lycium pallidum*	16–48
14 winterfat	KRLA2	*Krascheninnikovia lanata*	8–24

State and transition model

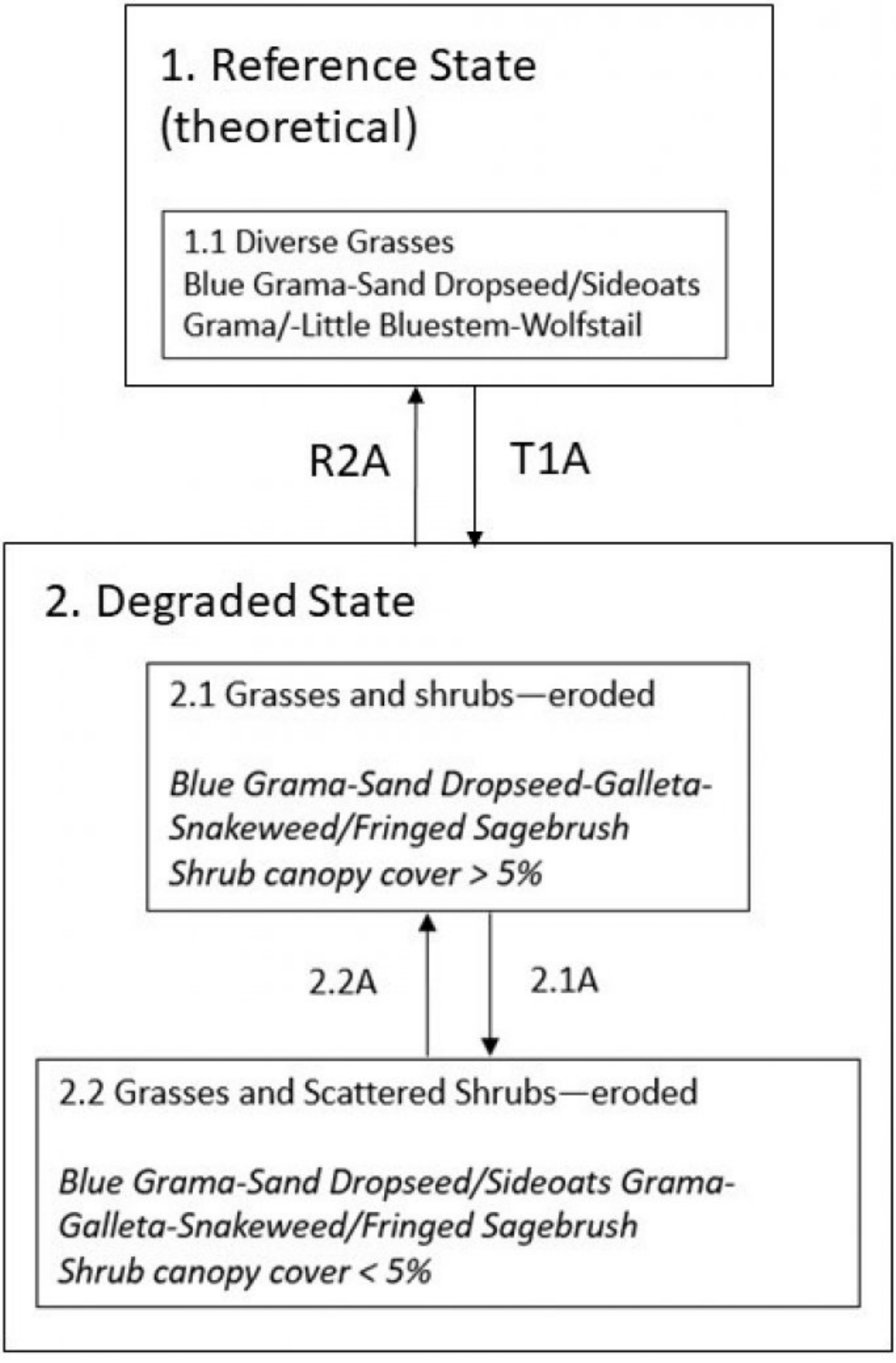

1. Reference State
(theoretical)
1.1 Diverse Grasses
Blue Grama-Sand Dropseed/Sideoats
Grama/-Little Bluestem-Wolfstail
R2A
T1A
2. Degraded State
2.1 Grasses and shrubs—eroded
Blue Grama-Sand Dropseed-Galleta-
Snakeweed/Fringed Sagebrush
Shrub canopy cover > 5%
2.2A
2.1A
2.2 Grasses and Scattered Shrubs—eroded
Blue Grama-Sand Dropseed/Sideoats Grama-
Galleta-Snakeweed/Fringed Sagebrush
Shrub canopy cover < 5%

Figure 4. State and transition model diagram for the Loamy Uplands site. Note that the reference state proposed here was not observed during reconnaissance, and is theoretical.

State 1
Reference State (theoretical)

This represents hypothesized conditions based on our observations and literature review. All observations made during the reconnaissance phase of this project appear to reflect degraded conditions—where significant topsoil loss has occurred, and most late-seral grass species have been extirpated.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- prairie sagewort (*Artemisia frigida*), shrub
- blue grama (*Bouteloua gracilis*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass
- sideoats grama (*Bouteloua curtipendula*), grass
- common wolfstail (*Lycurus phleoides*), grass

Community 1.1
Diverse Grasses (theoretical)

This community is expected to be dominated by grasses, but also contains a mix of forbs and shrubs. Blue grama is most likely the dominant grass; other major players would include sideoats grama, little bluestem, wolfstail, and sand dropseed. Shrubs, including broom snakeweed and fringed sagebrush, account for less than 2 percent cover. Total foliar cover would average 90 percent, and average annual production would be at least 1,100 pounds per acre.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- prairie sagewort (*Artemisia frigida*), shrub
- blue grama (*Bouteloua gracilis*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass
- sideoats grama (*Bouteloua curtipendula*), grass
- common wolfstail (*Lycurus phleoides*), grass

State 2
Degraded State

Community 2.1
Grasses and Shrubs—eroded

Figure 5. Community 2.1 in Mora County, October 2018. Note the sod-bound habit of blue grama and the relative abundance of broom snakeweed.

This community is dominated by grasses, but also considerable shrub cover, as well as number of forb species. Foliar cover is between 55 and 90 percent, and bare ground is typically less than 30 percent. Total canopy cover of warm-season grasses is between 50 and 75 percent; cool-season grass cover is generally below 1 percent. Shrub cover ranges from 5 to 20 percent. Forbs, while often diverse, rarely account for more than 5 percent cover. Annual production averages around 850 pounds per acre, but can range between 600 and 1,100 pounds per acre, depending mostly on annual weather patterns. This community occurs in areas with histories of prolonged season-long grazing. Blue grama is the dominant grass, but sand dropseed and galleta are major players. Bottlebrush squirreltail is the only cool-season grass observed in this phase. Shrubs are a significant component—with broom snakeweed being more common at lower elevations and eastern latitudes and fringed sage is more common toward the higher/cooler end of the spatial/climatic gradient. While forbs represent a small percentage of foliar cover, their species richness is quite high—leading to colorful displays following major rain events. In contrast to Community 2.2, sideoats grama is conspicuously absent in 2.1, suggesting one or both of two phenomena: A vigorous shrub community may be particularly effective in suppressing this grass, and/or sideoats grama is extirpated in a continuous grazing regime that selects for shrubs.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- prairie sagewort (*Artemisia frigida*), shrub
- blue grama (*Bouteloua gracilis*), grass
- alkali sacaton (*Sporobolus airoides*), grass
- James' galleta (*Pleuraphis jamesii*), grass

Community 2.2
Grasses and Scattered Shrubs—eroded (diagnostic plant community)

Figure 6. Community 2.2 in Colfax County, August 2018. Note the sod-bound habit of blue grama and the relative dearth of shrubs.

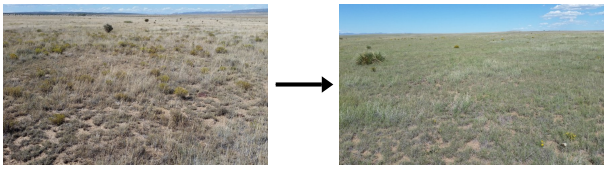
Figure 7. Community 2.2 in Colfax County, September 2017. This represents the upper end of production for this phase. Note the cespitose habit of blue grama here, suggesting that grazing has either been deferred or rotated in recent years.

This community is dominated by grasses, but usually contains scattered shrubs, as well as number of forb species. Foliar cover is between 65 and 90 percent, and bare ground is typically less than 25 percent. Total canopy cover of warm-season grasses is between 60 and 90 percent; cool-season grasses generally constitute less than 1 percent cover, and are often absent. Shrub cover ranges up to 5 percent. Forbs, while often diverse, rarely account for more than 5 percent cover. Annual production averages around 1,000 pounds per acre, but can range between 750 and 1,300 pounds per acre, depending mostly on annual weather patterns. This community occurs in areas with histories of prolonged season-long grazing. Blue grama is the dominant grass, but sand dropseed, sideoats grama, and galleta are major players. Little bluestem or wolfstail is often present in small amounts. Bottlebrush squirreltail is the only cool-season grass observed in this phase. Shrubs are common, if far from dominant—with broom snakeweed being more abundant at lower elevations and eastern latitudes and fringed sage being more abundant toward the higher/cooler end of the spatial/climatic gradient. While forbs represent a small percentage of foliar cover, their species richness is quite high—leading to colorful displays following major rain events.

Dominant plant species

- broom snakeweed (*Gutierrezia sarothrae*), shrub
- prairie sagewort (*Artemisia frigida*), shrub
- blue grama (*Bouteloua gracilis*), grass
- sand dropseed (*Sporobolus cryptandrus*), grass
- sideoats grama (*Bouteloua curtipendula*), grass
- James' galleta (*Pleuraphis jamesii*), grass

Pathway P2.1A
Community 2.1 to 2.2



Grasses and Shrubs—eroded

Grasses and Scattered Shrubs —eroded (diagnostic plant community)

This pathway represents conditions that advantage perennial grasses over shrubs: prescribed/deferred grazing, fire, herbicide application, or some combination of these. In order for prescribed fire to be effective, adequate fuel loads must be present. Thus, a period of deferred grazing is most often a necessary precedent to fire.

Pathway P2.2A
Community 2.2 to 2.1

Grasses and Scattered Shrubs—eroded (diagnostic plant community)

Grasses and Shrubs—eroded

This pathway represents a period of heavy grazing, typically season-long, which advantages the growth and reproduction of shrubs and suppresses herbaceous species that are more palatable and/or less resilient under grazing pressure. Regardless of the mechanism, sideoats grama is either suppressed or extirpated in this pathway.

Transition T1A
State 1 to 2

Slow variables: An extended period of season-long grazing, providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization. The loss of herbaceous plant production leads to decreases in total canopy cover, and reductions in the thickness of topsoil and its organic matter concentration. The result is an increase in the rate of wind and water erosion—leading to the loss of topsoil and an associated decrease in available water and nutrients. Trigger event: A severe drought kills already-weakened perennial grasses, resulting in a major loss in canopy cover. This, in turn, accelerates erosion. Threshold: The vigor and cover of perennial grasses is reduced to a point at which perennial grasses die and soil surfaces become highly susceptible to erosion. One or both of the following grasses are extirpated: little bluestem and/or wolfstail.

Restoration pathway R2A
State 2 to 1

Since State 1 is hypothetical, so are the means by which it could be re-established. These methods may vary. However, the result must ne the re-establishment of extirpated late-seral grasses and the restoration of topsoil. Thus, this would require a long-term approach and significant energy inputs.

Additional community tables

Animal community

(From R070AY001NM) This site provides habitats which support a resident animal community that is characterized by pronghorn antelope, badger, black-tailed jackrabbit, black-tailed prairie dog, thirteen-lined ground squirrel, prairie pocket gopher, marsh hawk, burrowing owl, horned lark, meadowlark, scaled quail, prairie rattlesnake, Great Plains toad, and ornate box turtle. The prairie falcon hunts yearlong over these habitats. These short grass sites are breeding areas for the long-billed curlew, upland plover, and lark bunting.

Hydrological functions

The Loamy ecological site is not associated with a wetland or riparian system; it is an upland ecological site. Because this site occurs on linear or convex portions of plateau summits, it tends to shed water (via through-flow or run-off) to sites lower in the catena.

Wood products

This site rarely produces trees. However, oneseed juniper does encroach in some disturbed sites.

Other information

Future Work:
It is possible that components that fit this site concept, but have greater than or equal to 35 percent clay in the surface horizon (thus correlating to the current Clayey Upland site) differ significantly in ecological function from those components with less than 35 percent clay at the surface. Once exhaustive Tier 1 data collection has been performed on this site, correlations between plant community parameters and surface texture should be explored.

Also, soils with fine sandy loam and very fine sandy loam surface textures (correlated to the Seelez soil series) have been observed to support plant communities that match those observed on this site. At present, we lack the data to assess whether these sandy soils truly fit the Loamy Uplands ecological site, or whether their associated plant communities merely resemble this site when in degraded states. It is also possible that fine sandy loams with lower clay percentages produce different reference states (such as those of the Sandy site) than those with higher clay (which might fit the Loamy Uplands site). Future update projects should focus on identifying and comparing reference plant communities on the Colmor and Seelez soil series.

ESD Workgroup:
Logan Peterson, MLRA 70 Soil Scientist, NRCS
Aaron Miller, MLRA 70 Project Leader, NRCS
Robert (Scott) Woodall, Region 8 Ecological Site Specialist, NRCS

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Contributors

Aaron Miller
Logan Peterson

Approval

Curtis Talbot, 10/01/2021

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	05/20/2024
Approved by	Curtis Talbot
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:**