USDA Natural Resources Conservation Service

Ecological site R036XB014NM
Shallow Loam

Last updated: 9/07/2023
Accessed: 05/11/2024

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): 036X–Southwestern Plateaus, Mesas, and Foothills

This MLRA is in New Mexico (58 percent), Colorado (32 percent), and Utah (10 percent). It makes up about 23,885 square miles (61,895 square kilometers). The major towns in the area are Cortez and Durango, Colorado; Santa Fe and Los Alamos, New Mexico; and Monticello, Utah. The city of Grand Junction in Colorado, and Interstate 70 are just outside the northern tip of this area. Interstate 25 crosses through the middle of the MLRA, and U.S. Highway 550 runs along the MLRA's southwest boundary in New Mexico. Mesa Verde National Park and the Bandelier, Hovenweep, Natural Bridges, Yucca House, and Colorado National Monuments are in the area. Many Indian reservations are in this MLRA. The largest are the Southern Ute, Ute Mountain, and Jicarilla Apache Reservations. Also in the area are the Cochiti, Jemez, Nambe, Navajo, Picuris, Pojoaque, San Felipe, San Ildefonso, San Juan, Sandia, Santa Ana, Santa Clara, Santa Domingo, Taos, Tesuque, and Zia Reservations.

This MLRA is within the Intermontane Plateaus Region. It is mainly in the Canyon Lands and Navajo Sections of the Colorado Plateau Province, partly in the Mexican Highland Section of the Basin and Range Province, and extends marginally into the Southern Rocky Mountains Province. Underlying sedimentary rock controls the landforms seen in most places, but fluvial landforms are in the Rio Grande Rift Basin at the southeastern portion of the MLRA. The elevation is commonly 4,600 to 8,500 feet (1,400 to 2,590 meters) and is generally highest (as high as 9,300 feet or 2,835 meters) in the foothills and high mesas that border the Southern Rocky Mountains. Relief is typically less than 1,500 feet (455 meters). The upper reaches of the Rio Grande and San Juan Rivers and their tributaries are in the part of this MLRA, near the Colorado and New Mexico state lines. The Rio Puerco and Rio Chama Rivers are in the New Mexico part of the MLRA. The Dolores and San Miguel Rivers are in the Colorado part of the MLRA, and a short reach of the Colorado River crosses this MLRA near the Utah and Colorado state lines.

Predominantly horizontal sedimentary beds from the Jurassic, Cretaceous, and Tertiary Periods underlie most of the MLRA. Representative formations are the Morrison Formation, Dakota Sandstone, Mancos Shale, Cliff House Sandstone, and other members of the Mesa Verde Group, including the Animas Formation and the San Jose Formation. The sedimentary rocks have eroded into plateaus, mesas, hills, and canyons. Thick eolian deposits from the Pleistocene Epoch blanket the tops of mesas in some areas. Small areas of Tertiary and Quaternary volcanic rocks, including cinder cones and lava flows, are in the Rio Grande Rift Basin in New Mexico. Broad valleys in the rift basin have accumulations of deep alluvial sediments, and fan remnants are commonplace.

The dominant soil orders in this MLRA are Alfisols, Inceptisols, Mollisols, Entisols, and Aridisols. The soil moisture regime is mainly ustic, but an aridic soil moisture regime that borders on ustic is present in some areas. The soil temperature regime is mesic or frigid. Mineralogy is dominantly mixed or smectitic. In warmer places of the MLRA, shallow Ustorthents (Menefee Series) formed in residuum on shale hills and mesas. Shallow Haplustalfs (Arabrab Series) and Torriorthents (Rizno Series) formed in material weathered from sandstone on mesas, hills, and cuestas. Moderately deep, loamy Haplargids (Gapmesa Series) and very deep, loamy Haplustalfs (Orlie series) formed in slope alluvium derived from sandstone and shale on mesas or fan remnants. Very deep, clayey Haplustepts (Roques series) formed in alluvium derived from shale on valley sides. Very deep, silty Haplustalfs (Cahona and Wetherill Series) formed in eolian deposits on hills and mesas. In cooler places, very deep, clayey Haplustalfs

(Goldbug Series) formed in slope alluvium derived from sandstone and shale on hills and mesas. Shallow Argiustolls (Fivepine Series) formed in slope alluvium and residuum derived from sandstone. Moderately deep Argiustolls (Nortez Series) formed in eolian deposits derived from sandstone on hills and mesas.

LRU notes

MLRA 36X is in the Colorado Plateau, a physiographic province existing throughout eastern Utah, western Colorado, western New Mexico, and northern Arizona. Uplifted plateaus, canyons, and other land features formed by erosion are characteristic of the MLRA. The Colorado Plateau lies south of the Uintah Mountains, north of the Mogollon Rim in the Transition Highlands, west of the Rocky Mountains, and east of the highlands in central Utah. MLRA 36 is in the higher-elevation portion of the Colorado Plateau, which has

broken topography and lacks perennial water sources. This MLRA has a long history of use by prehistoric humans, and archaeological evidence indicates their activities modified the native pinyon-juniper woodlands. Additional alterations to the native conditions of the area occurred at the time of European settlement (Cartledge and Propper, 1993). Historically, this area also included the natural influences of herbivory, fire, and climate. However, the area rarely served as a habitat for large herds of native herbivores or large, frequent fires due to the broken topography. This ecological site is highly variable, and plant community composition varies in response to water fluctuations.

The lower part of MLRA 36X developed under climatic conditions of hot and dry summers, summer rain showers, mild winter temperatures, and little to no snow. This area has climatic fluctuations, ranging from above-average annual precipitation to years of drought, and prolonged droughts are commonplace.

Forbs are the most dynamic vegetative component of the plant communities in the MLRA, and species composition can vary up to fourfold on any given ecological site (Passey et al., 1982). The precipitation and climate of MLRA 36X are conducive to producing pinyon-and-juniper and sagebrush complexes and highly-productive sites at the bottoms of canyons. The dominant species in the Colorado Plateau are Wyoming big sagebrush (Artemisia tridentata var. wyomingensis), mountain big sagebrush (Artemisia tridentata var. vaseyana), and black sagebrush (Artemisia nova), basin big sagebrush (Artemisia tridentata ssp. tridentata), Utah juniper (Juniperus utahensis), oneseed juniper (Juniperus monosperma), and twoneedle pinyon (Pinus edulis). Oneseed juniper can discontinue active growth under limited moisture conditions and resume growth when moisture availability improves. This growth pattern may represent a critical adaptation allowing them to survive on very arid sites. It is possible that drought may kill small trees, but mature oneseed junipers are resilient to drought, especially in comparison to twoneedle pinyon (Johnsen, 1962).

The Land Resource Unit (LRU) has 10 to 16 inches of annual precipitation and a mesic soil temperature regime. The LRU is in the lower part of MLRA 36X and is dominated by monsoons in summer, unlike the upper part of MLRA 36X.

Classification relationships

NRCS & BLM:
Major Land Resource Area 36, Southwestern Plateaus Mesas and Foothills (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS:
313Bd Chaco Basin High Desert Shrubland and 313Be San Juan Basin North subsections < 313B Navaho Canyonlands Section < 313 Colorado Plateau Semi-Desert (Cleland, et al., 2007).

315Ha Central Rio Grande Intermontane, and 315Hb North Central Rio Grande Intermontane subsections <315H Central Rio Grande Intermontane Section < 315 Southwest Plateau and Plains Dry Steppe and Shrub (Cleland, et al., 2007).

315Ad Chupadera High Plains Grassland subsections <315A Pecos Valley Section < 315 Southwest Plateau and Plains Dry Steppe and Shrub (Cleland, et al., 2007).

331Jb San Luis Hills and 331Jd Southern San Luis Grasslands subsections <331J Northern Rio Grande Basin Section < 331 Great Plains- Palouse Dry Steppe (Cleland, et al., 2007).

M313Bd Manzano Mountains Woodland subsection Sacramento-Monzano Mountains Section M313 Arizona-New Mexico Mountains Semi-Desert - Open Woodland - Coniferous Forest - Alpine Meadow

M331Fg Sangre de Cristo Mountains Woodland and M331Fh Sangre de Cristo Mountains Coniferous Forest subsection M331F Southern Parks and Rocky Mountain Range Section M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow M331Gk Brazos Uplift and M331Gm Jemez and San Pedro Mountains Coniferous Forest subsections M331G South Central Highlands Section M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

EPA:
21d Foothill Shrublands and 21f Sedimentary Mid-Elevation Forests < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains (Griffith, 2006).

20c Semiarid Benchlands and Canyonlands < 20 Colorado Plateaus < 10.1 Cold Deserts < 10 North American Deserts (Griffith, 2006).

22m Albuquerque Basin, 22i San Juan/Chaco Tablelands and Mesas, 22h North Central New Mexico Valleys and Mesas, 22f Taos Plateau, and 22g Rio Grande Floodplain, < 22 Arizona/New Mexico Plateau < 10.1 Cold Deserts < 10 North American Deserts (Griffith, 2006).

USGS:
Colorado Plateau Province (Navajo and Datil ection) Southern Rocky Mountains Basin and Range (Mexican Highland and Sacramento Section)

Ecological site concept

The Shallow Loam Ecological Site in MLRA 36XB originates from the pre-existing Shallow Loam (R036XB014NM) range site (NRCS, 2003). The effective precipitation for the site ranges from 10 to 16 inches. This site is on ridges, hills, interfluves of undulating plateaus, escarpments, and steeply-sloping areas of cuestas and mesas. The site has an aridic ustic or ustic aridic soil moisture regime and a mesic soil temperature regime. The surface soil texture is commonly sandy loam or loam, and cobbles or gravel are typically present.

Associated sites

R035XA130NM	**Shale Hills 10-14"p.z.** The Shale Hills 10-14” P.Z. Ecological Site has an annual precipitation range of 10 to 16 inches. The slope for the site ranges from 3 to 35 percent. The soils are deep, and surface textures is commonly cobbly clay loam or very stony silty clay loam. Subsoil texture is clay or clay loam. The soils are calcareous at a depth of 14 to 20 inches below the surface down to 60 inches. The parent material is shale. Landforms include side slopes of mesas and small arroyos dissecting the landscape.
R035XG114NM	**Gravelly** The Gravelly Ecological Site has an annual precipitation range of 10 to 16 inches. The slope for the site ranges from 0 to 35 percent. Soils are moderately deep to very deep. The surface horizon and underlying horizons have a texture of gravelly or very gravelly loam, sandy loam, or fine sandy loam. The site is on gently or strongly sloping rolling hills, ridges, or natural arroyos dissecting the landscape. The site can also be adjacent to rock outcrops or in very steeply sloping areas of badlands.

Similar sites

R036XY408CO	**Basin Shale** The Basin Shale Ecological Site has an annual precipitation range of 9 to 12 inches. The slope for the site ranges from 1 to 20 percent. The soils are shallow to moderately deep. Surface texture is commonly silty clay loam, and subsoil texture is silty clay or clay loam. Parent material is shale alluvium and residuum from the Mancos and Morrison Formations. Landforms are low alluvial terraces, ridges, hills, structural benches, and alluvial fans.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia nova*
Herbaceous	(1) *Pascopyrum smithii* (2) *Elymus elymoides*

Physiographic features

This ecological site occurs on ridges, hills, interfluves on undulating plateaus, escarpments on cuestas, and escarpments on mesas. It is often just below the ponderosa pine zone where there is no pinyon-juniper woodland. It is also located on the toe slopes of the San Antonio Mountains. Slopes range from 1 to 25 percent. There are several steep map units (35 to 70 percent slopes) assigned to this site. Elevation ranges from 5,700 to 8,700 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Ridge (2) Escarpment (3) Interfluve
Flooding frequency	None
Ponding frequency	None
Elevation	1,737–2,652 m
Slope	1–25%
Aspect	W

Climatic features

This ecological site has a semi-arid continental climate. There are distinct seasonal temperature variations. Mean annual precipitation varies from 10 to 16 inches. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. Wide yearly and seasonal fluctuations are common for this climatic zone which can range from 5 to 25 inches. Of this, approximately 25 to 35 percent falls as snow, and 65 to 75 percent falls as rain between April 1 and November 1. The growing season is April through September. As much as half or more of the annual precipitation can be expected to come during the period of July through September. August is typically the wettest month of the year. The driest period is usually from November to April; and February is normally the driest month. During July, August, and September, 4 to 6 inches of precipitation influence the presence and production of warm-season plants. Fall and spring moisture is conducive to the growth of cool-season herbaceous plants and maximum shrub growth. Growth usually begins in March and ends with plant maturity and seed dissemination when the moisture deficiency and warmer temperatures occur in early June. There is also a period of growth in the fall. Summer precipitation is characterized by brief thunderstorms, normally occurring in the afternoon and evening. Winter moisture usually occurs as snow, which seldom lies on the ground for more than a few days. The average annual total snowfall is 29.1 inches. The snow depth usually ranges from 0 to 1 inches during the winter months. The highest snowfall record is 57.1 inches during the 1993-1994 winter. The frost- free period typically ranges from 110 to 145 days and the freeze free period is from 140 to 170 days. The last spring freeze is the middle of April to the first week of May. The first fall freeze is the middle of October to the first week of November. Mean daily annual air temperature is about 29ºF to 69ºF, averaging about 37ºF for the winter and 67ºF in the summer. The coldest winter temperature recorded was -20ºF on January 6, 1971 and the warmest winter temperature recorded was 70ºF on February 28, 1965. The coldest summer temperature recorded was 26ºF on June 1, 1980. The hottest day on record is 100ºF on July 9, 2003 and June 21, 1968. Data taken from Western Regional Climate Center (2017) for El Rito, New Mexico Climate Station.

Table 3. Representative climatic features

Frost-free period (characteristic range)	101-136 days
Freeze-free period (characteristic range)	139-172 days

Precipitation total (characteristic range)	254-406 mm
Frost-free period (actual range)	74-140 days
Freeze-free period (actual range)	104-176 days
Precipitation total (actual range)	254-406 mm
Frost-free period (average)	113 days
Freeze-free period (average)	150 days
Precipitation total (average)	330 mm

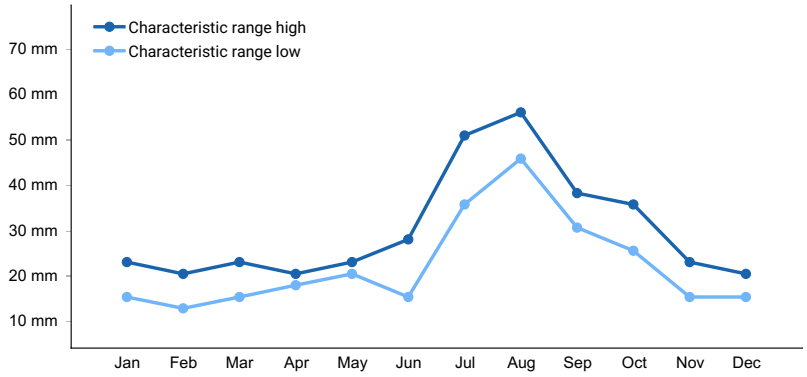

Figure 1. Monthly precipitation range

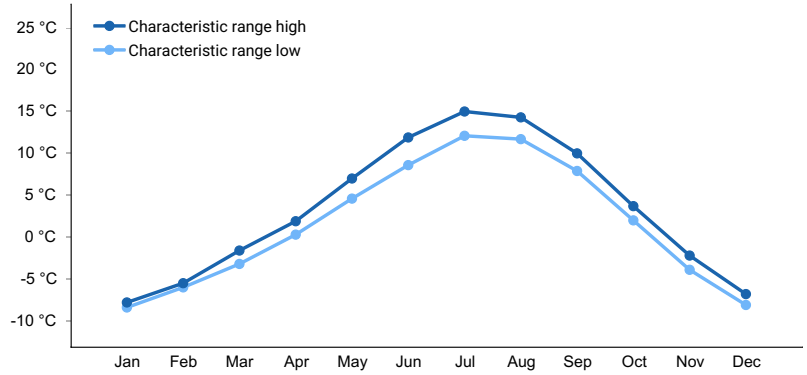

Figure 2. Monthly minimum temperature range

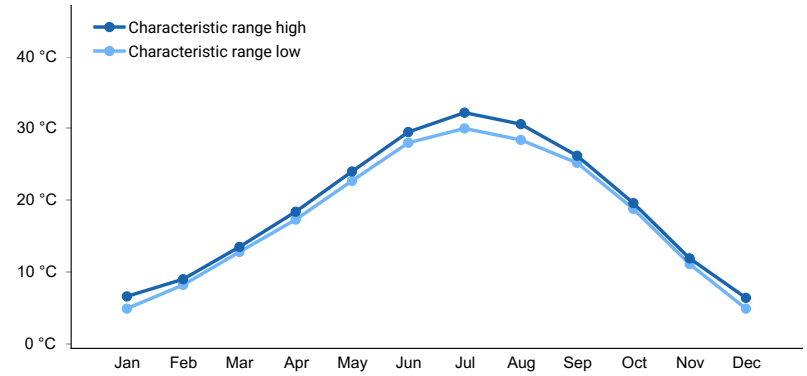

Figure 3. Monthly maximum temperature range

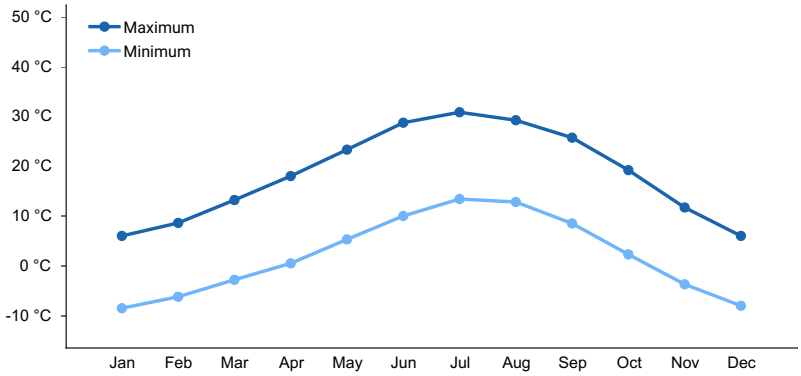

Figure 4. Monthly average minimum and maximum temperature

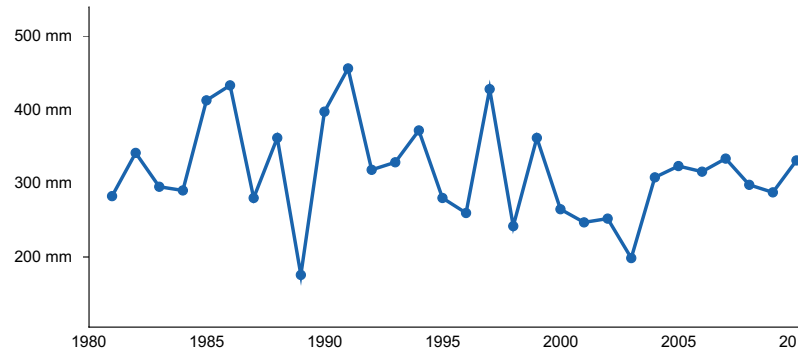

Figure 5. Annual precipitation pattern

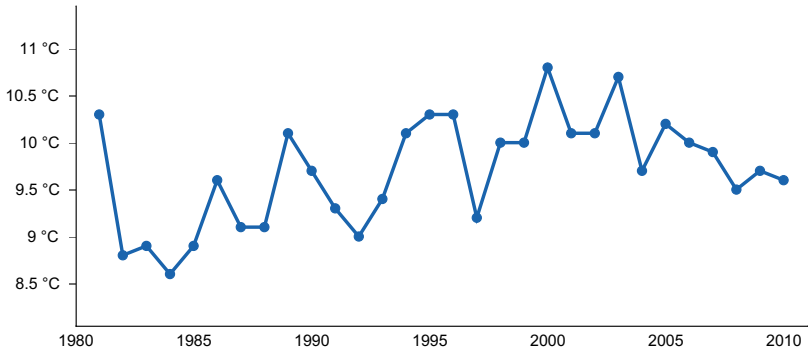

Figure 6. Annual average temperature pattern

Climate stations used

- (1) NAVAJO DAM [USC00296061], Navajo Dam, NM
- (2) LYBROOK [USC00295290], Dulce, NM
- (3) CUBA [USC00292241], Cuba, NM
- (4) COCHITI DAM [USC00291982], Pena Blanca, NM
- (5) ABIQUIU DAM [USC00290041], Gallina, NM
- (6) EL RITO [USC00292820], El Rito, NM
- (7) SANTA FE 2 [USC00298085], Santa Fe, NM

Influencing water features

This site is not influenced by water from a wetland or streams.

Soil features

The soils in this ecological site are very shallow to shallow (5 to 20 inches in depth). Fronton and Churipa soils are well drained. Vessilla is somewhat excessively drained. The surface soil is a sandy loam to loam in texture cobbles or gravels are present frequently. Surface texture range from 12 to 22 percent clay. Subsoil at 20 inches in depth

range from 12 to 45 percent clay. Parent materials are alluvium derived from basalt over volcanic ash over alluvium derived from scoria; mixed alluvium and residuum weathered from igneous and sedimentary rock; residuum weathered from sandstone and shale; and eolian deposits over slope alluvium derived from sandstone.

This site is found in NM678, NM606, and NM692 soil surveys. This ecological site has been correlated to the following soils Churipa, Vessilla, and Fronton.

Table 4. Representative soil features

Parent material	(1) Alluvium–basalt (2) Residuum–sandstone and shale (3) Slope alluvium–sandstone
Surface texture	(1) Very cobbly loam (2) Gravelly loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Slow to moderately rapid
Soil depth	13–51 cm
Surface fragment cover <=3"	10–25%
Surface fragment cover >3"	2–15%
Available water capacity (0-101.6cm)	1.78–6.6 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	5–25%
Subsurface fragment volume >3" (Depth not specified)	2–15%

Ecological dynamics

The fire risk associated with an ecological site depends primarily on the fuel load and plant moisture content. Plant communities with small fuel loads will burn more slowly and less intensely than those with large fuel loads. Fire is a critical aspect of grass-dominated ecological sites. According to the Fire Effects Information System (FEIS), vegetation modeling of black sagebrush puts historical fire intervals at 12 to 70 years on southwest grassland sites and 20 to 30 years on southwest shrublands (Fryer, 2009). LANDFIRE successional modeling for mixed dwarf sagebrush communities, which includes black sagebrush in the southwest, estimates the historical fire-return interval at 79 to 1,250 years (USFS, 2012). Historically, fires varied in intensity and frequency depending on site productivity. “Fire is not a major ecological component of. . .black and other dwarf sagebrush [communities] (Winward, 2001).” The time necessary for post-fire recovery of black sagebrush has not been well-documented. Shrub vegetation can reestablish from seed dispersal via adjacent non-burned shrub stands; however, the process is relatively slow. When the site degrades from the presence of invasive annuals, the fire-return interval shortens because of increased fuels. The shortened fire- return interval is often sufficient to suppress the native plant community.

Variability in climate, soils, aspect, and complex biological processes will cause plant communities to differ. The factors contributing to the annual production variability include the use of the site by wildlife, drought, and the

presence of insects. Factors contributing to site variability include soil texture, depth, rock fragments, slope, aspect, and microtopography. The species lists for the site are representative and not a complete list of all species present or potentially present. The lists do not cover the full range of conditions, species, or responses for the site. The state-and-transition model below uses available research, field observations, and expert interpretations that could change as knowledge increases. After more data collection, some of these plant communities may be revised or removed, and new ones added. The following diagram does not necessarily include all the transitions and states this site may exhibit, but it does show some of the most common plant communities.

State and transition model

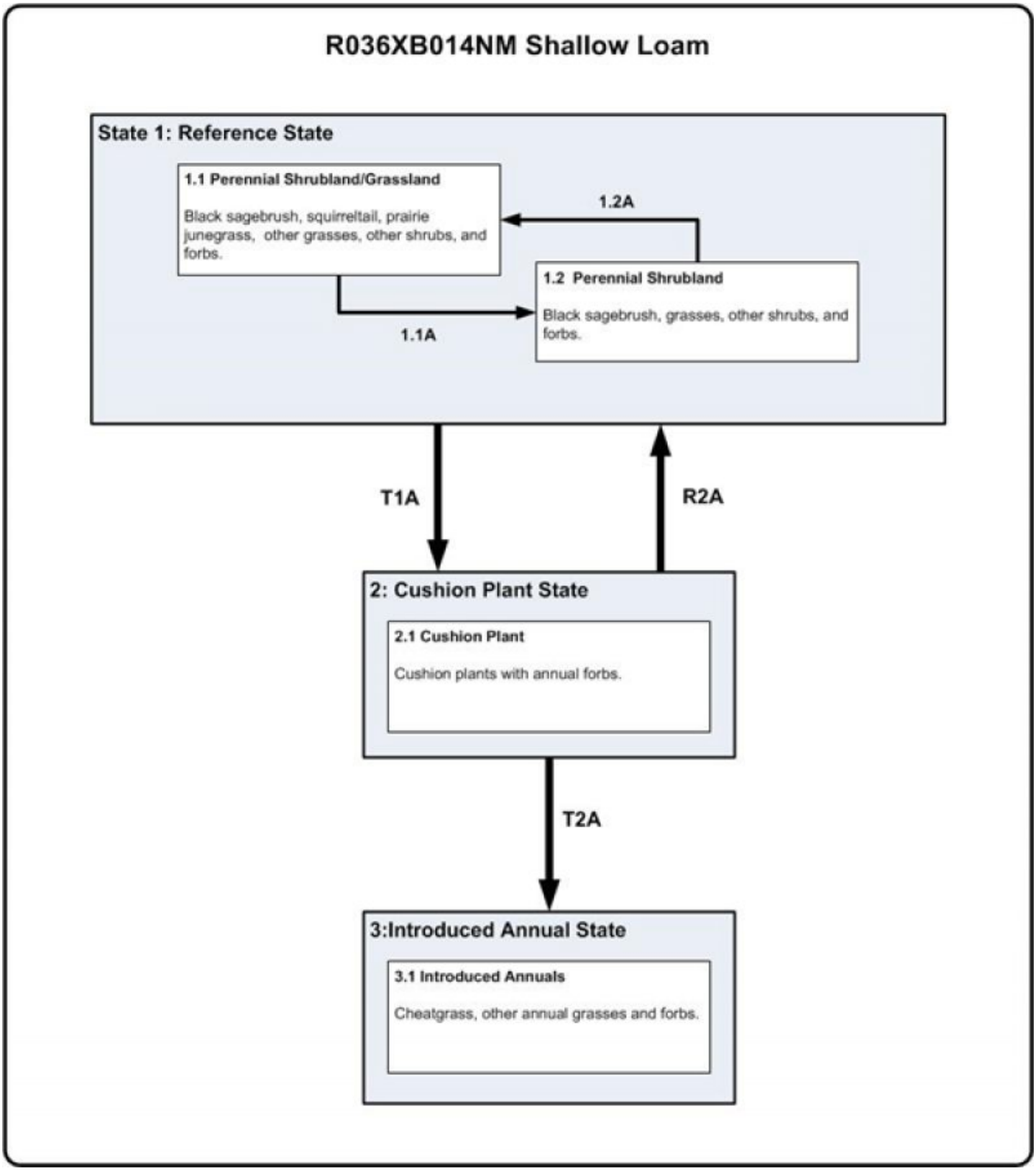

Figure 7. STM

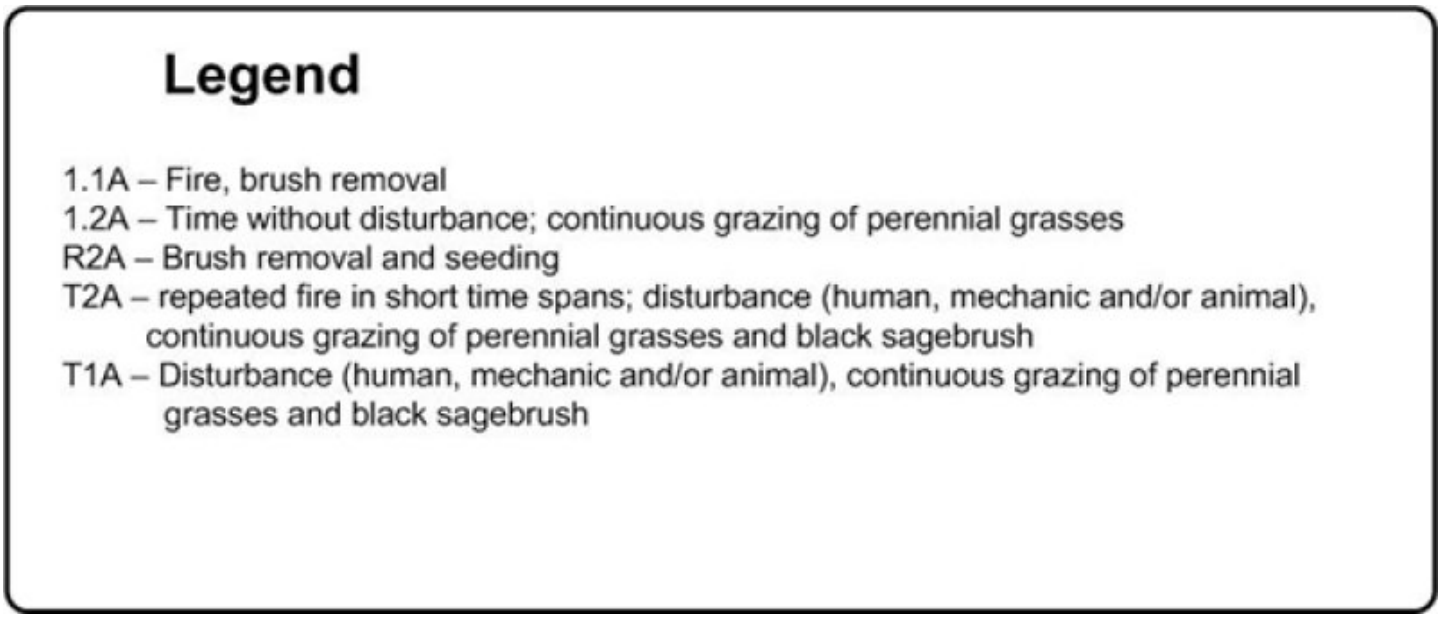

Figure 8. Legend

State 1
Reference State

The Reference State is a shrubby grassland and consists of black sagebrush, western wheatgrass, other grasses, and scattered shrubs. Western wheatgrass, sideoats grama, prairie Junegrass, and squirreltail contribute to a sparse grassland appearance. Black sagebrush has a noticeable place on this site under the Reference State. Fluctuations in species composition and relative production may change depending on precipitation and other climatic factors. Black sagebrush communities historically experienced an extended fire-return interval due to widely-spaced shrubs and low herbaceous (fine-fuel) production. The establishment of sagebrush occurs solely from seed, and recruitment pulses are episodic and based on favorable climatic conditions. Browsing of black sagebrush needs monitoring to ensure it does not become too heavy and that new and young seedlings are establishing in numbers high enough to replace the current stand. Drought can compound the problem of heavy browsing (Winward, 2004). Continuous grazing, which allows repetitive grazing of the desirable species, eventually leads to a decrease in the following species from the plant community: western wheatgrass, sideoats grama, prairie Junegrass, Arizona fescue, and needle and thread. Undesirable species that increase from continuous grazing include blue grama, rabbitbrush, and black sagebrush. If these species continue to dominate, severe site deterioration will follow.

Community 1.1
Perennial Shrubland/Grassland

The sparse appearance of this plant community is due to the absence of large shrubs. Grasses and cushion-type forbs are characteristic of this community. Important grasses are western wheatgrass, sideoats grama, prairie Junegrass, Arizona fescue, and needle and thread. Cushion-type and mat-forming forbs and shrubs include black sagebrush, yellow rabbitbrush, buckwheat, daisy, rubberweed, and paintbrush. This plant community is long-lived and stable and rarely experiences natural large-scale disturbances. This plant community instead experiences small-scale disturbances which remove patches of mature vegetation. Initially, grasses and forbs dominate the disturbed areas because they benefit from reduced competition in the absence of shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	314	471	628
Forb	34	59	78
Shrub/Vine	45	58	78
Total	**393**	**588**	**784**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	25-35%
Grass/grasslike foliar cover	10-20%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-15%
Surface fragments >0.25" and <=3"	5-15%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	55-65%

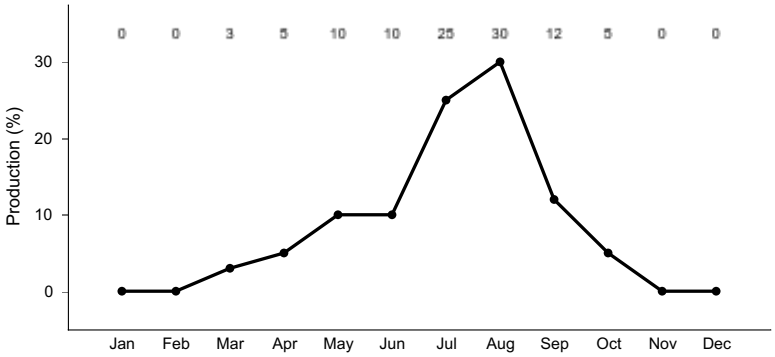

Figure 10. Plant community growth curve (percent production by month). NM0014, R036XB014NM Shallow Loam HCPC. R036XB014NM Shallow Loam HCPC Shrub-grassland.

Community 1.2
Perennial Shrubland

Western wheatgrass, blue grama, rabbitbrush, and black sagebrush will increase under mismanaged grazing. There are a few remnant herbaceous plants underneath the sagebrush, but the number of understory plants remaining may not be capable of reseeding the site if there is a disturbance. The sagebrush would become a single-aged stand. Prairie Junegrass, sideoats grama, and Arizona fescue has diminished in this community phase. Also, less-palatable shrubs, such as yellow rabbitbrush and snakeweed, will increase and replace part of the herbaceous component. The lack of an understory helps to suppress low-intensity fires because there is no fuel to carry the fire unless it is a high-intensity fire. Increased sagebrush canopy can be due to a lack of disturbance, such as wildfire. Cumulative effects of degrading sagebrush habitats could include higher rates of erosion and sedimentation, diminished water quality, a decline in forage base for domestic livestock, and reduced habitat for wildlife species (McIver et al., 2010). This community phase has less species diversity compared to that of Community 1.1.

Pathway 1.1A
Community 1.1 to 1.2

The main drivers for this pathway are improper grazing and lack of fire or other disturbances. Improper grazing can diminish the understory, increase sagebrush canopy, and reduce the time it takes to transition from Community 1.1 to 1.2. Extended drought can also shorten the timeframe of this transition. Improper browsing and grazing of understory species can cause a shift in the plant community, alongside frequent fires occurring before sagebrush seed set. However, this pathway can occur after the understory seed set or as a result of a large-scale insect or pathogen-induced die-off of sagebrush (Evers et al., 2011).

Pathway 1.2A
Community 1.2 to 1.1

Naturally-occurring fire-return intervals and intensities characterize this pathway (McIver et al., 2010). Fire only occurs on this site in normal or above-normal precipitation years. This site needs adequate precipitation to induce a fire because moisture produces the necessary fine fuels. Wildfires, prolonged drought, disease, or insect attacks will kill shrubs. Proper grazing management, including timing and restoration periods, will restore native grasses and perennial forbs and revert the site to Community 1.1. Shrub management, including herbicide application and mowing, can also trigger this pathway. Drought and prescribed grazing or improper grazing can influence the timeframe of this community pathway. Management practices should focus on restoring the associated forb and grass species that historically helped cover openings between black sagebrush crowns. (Winward, 2004).

State 2
Cushion Plant State

The Cushion Plant State is present following frequent and heavy browsing of black sagebrush during the winter. The crowns of heavily-browsed black sagebrush become rounded instead of the typical irregular, spreading, U-shape. Black sagebrush can be almost level with the ground after severe browsing (Fryer, 2009). This state is at risk for excessive wind and water erosion, and the biotic integrity is also compromised. The bare ground cover increases in this state, and the interspaces between plants are more sizeable. Black sagebrush is still present on the site and may dominate the total shrub cover. However, black sagebrush is approximately 2 to 4 inches in height rather than the typical 4 to 12 inches. Plants such as western wheatgrass, yellow rabbitbrush, and low-growing forbs dominate the site in the Cushion Plant State.

Community 2.1
Cushion Plant

Small-statured plants and cushion plants are representative of this community phase. Plants such as blue grama, Sandberg bluegrass, rubberweed, and broom snakeweed can also be present in this community.

State 3
Introduced Annual State

This state can develop when fire-return intervals are frequent or when the native perennial understory is sparse or absent.

Community 3.1
Introduced annuals

Introduced annuals and biennial forbs are characteristic of this plant community. Plants such as cheatgrass, Russian thistle, saltlover (*Halogeton glomeratus*), annual sunflowers, and yellow salsify are commonplace in this community.

Transition T1A
State 1 to 2

There are several drivers for this transition. The first driver for this transition is long-term, excessive, year-long livestock grazing. Trampling and bedding (especially by large flocks of domestic sheep), prolonged animal bedding, salting, watering, and use of handling locations can accelerate this transition. The second driver is long-term damage caused by trail and road development or excessive trail development. The third driver is long-term herbivory by wildlife and upland species that diminish the shrubs and grass. Herbivory can happen on sites located on ridges and hills where the snow melts and allows for year-round use by livestock and wildlife. The only plants remaining are those tolerant of drought, infertile soil, mechanical disturbances, and herbivory. A combination of all three drivers in varying proportions can also trigger this transition.

Restoration pathway R2A
State 2 to 1

The driver for this restoration pathway is grazing only during the non-growing season for the herbaceous component and wildlife management. The broadcast reseeding of native perennial forbs and grasses must accompany this management regime to trigger the pathway.

Transition T2A
State 2 to 3

The driver for this transition is a frequent fire-return interval or a sparse or absent native perennial understory.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				177–206	
	western wheatgrass	PASM	*Pascopyrum smithii*	177–206	–
2				177–206	
3				29–59	
	sideoats grama	BOCU	*Bouteloua curtipendula*	29–59	–
4				47–71	
	squirreltail	ELEL5	*Elymus elymoides*	47–71	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	47–71	–
5				12–36	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	12–36	–
	Arizona fescue	FEAR2	*Festuca arizonica*	12–36	–
Forb					
6				18–36	
	aster	ASTER	*Aster*	18–36	–
	buckwheat	ERIOG	*Eriogonum*	18–36	–
	beardtongue	PENST	*Penstemon*	18–36	–
7				12–29	
	scarlet Indian paintbrush	CACO17	*Castilleja coccinea*	12–29	–
	gilia	GILIA	*Gilia*	12–29	–
8				12–24	
	spike dropseed	SPCO4	*Sporobolus contractus*	12–24	–
9				6–18	
	pingue rubberweed	HYRI	*Hymenoxys richardsonii*	6–18	–
10				18–36	
	Forb, perennial	2FP	*Forb, perennial*	18–36	–
Shrub/Vine					
11				89–118	
	black sagebrush	ARNO4	*Artemisia nova*	89–118	–
12				6–12	
	heath	ERICA	*Erica*	6–12	–
13				12–29	
	gooseberry currant	RIMO2	*Ribes montigenum*	12–29	–
14				18–36	
	Shrub, deciduous	2SD	*Shrub, deciduous*	18–36	–

Animal community

Grazing:
Approximately 75 percent of the vegetative production on this ecological site is suitable for grazing or browsing by domestic livestock and wildlife. Grazing distribution is generally not a problem if adequate water sources are present. Continuous grazing, which allows repetitive grazing of desirable species, eventually leads to their diminishment from the plant community. Desirable species include western wheatgrass, sideoats grama, prairie

Junegrass, Arizona fescue, and needle and thread. Less desirable species that increase due to overgrazing include blue grama, rabbitbrush, and black sagebrush. If these species continue to dominate, severe site deterioration will follow. A planned system that includes periodic deferment is best to maintain high productivity and the desirable balance between plant species. This site is susceptible to trampling damage when the soils are very wet.

Habitat for Wildlife:
This ecological site provides habitat that supports a resident animal community characterized by pronghorn antelope, white-tailed deer, jackrabbit, western harvest mouse, and prairie lark. These sites furnish critical foraging areas for pronghorn antelope in the fall and winter. If the ecological site is adjacent to forest cover, mule deer and elk will use the area seasonally.

Hydrological functions

The runoff curve numbers originate from field investigations using hydrologic cover conditions and hydrologic soil groups.

Recreational uses

There is a fair opportunity for plant and animal studies on this ecological site. There is also some opportunity for hunting and photography. Brush, forbs, and grasses have a variety of colors and forms on this site.

Wood products

This site produces no significant wood products in its potential plant community.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index----------Ac/AUM
100 - 76----------4.6 – 6.2
75 – 51----------6.1 – 9.3
50 – 26----------9.1 – 18.5
25 – 0----------18.5+

Inventory data references

The ecological data collection for this site coincided with progressive soil surveys in the New Mexico and Arizona Plateaus and Mesas and in MLRA 36 in New Mexico. This site is within the NM678, NM606, and NM692 soil survey areas.

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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 is required to refine the Plant Production and Annual Production tables for this ecological site. The extent of MLRA 36 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	05/11/2024
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:**

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

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

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

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

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

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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:

---

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):**

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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:**
