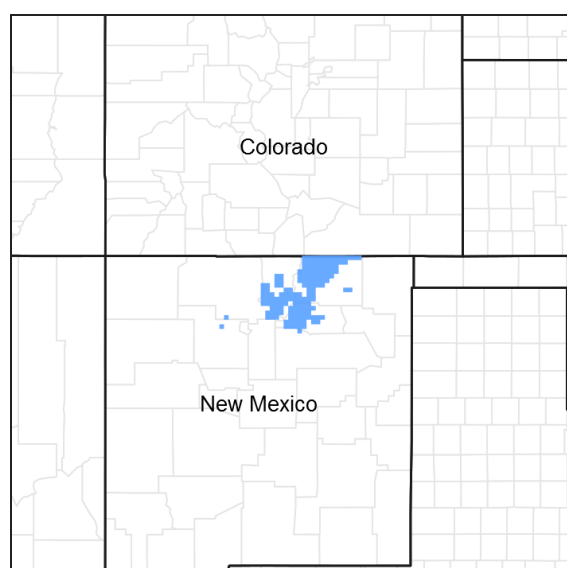


# **Ecological site R048AY010NM** **Pine Grassland**

Last updated: 3/05/2024  
 Accessed: 05/10/2025

## **General information**

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.



**Figure 1. Mapped extent**

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

## **MLRA notes**

Major Land Resource Area (MLRA): 048A–Southern Rocky Mountains

This area is in Colorado (76 percent), New Mexico (11 percent), Utah (8 percent), and Wyoming (5 percent). It makes up about 45,920 square miles (119,000 square kilometers). The towns Jemez Springs, Los Alamos, Red River and Eagle Nest, New Mexico, are in this MLRA. This MLRA has numerous national forests, the Carson National Forest and part of the Santa Fe National Forest in New Mexico. The Jemez, Picuris, Santa Clara, and Taos Indian Reservations are in this MLRA. Most of this area is in the Southern Rocky Mountains Province of the Rocky Mountain System. Small parts of the southwest corner and some isolated areas farther west are in the Canyon Lands Section of the same province and division. The Southern Rocky Mountains consist primarily of two belts of strongly sloping to precipitous mountain ranges trending north to south. Several basins, or parks, are between the belts. The ranges include the Sangre de Cristo Mountains, Jemez Mountains, and Tusas Mountains. Elevation typically ranges from 6,500 to 13,167 feet (1,980 to 1,039 meters) in this area. The Rio Grande is a National Wild and Scenic River in northern New Mexico, which is in the southern part of this MLRA.

The mountains in this area were formed mainly by crustal uplifts during the late Cretaceous and early Tertiary periods. The rocks exposed in the mountains are mostly Precambrian igneous and metamorphic rocks, which in many places are flanked by steeply dipping Mesozoic sedimentary rocks. Younger igneous rocks, primarily basalt and andesitic lava flows, tuffs, breccias, and conglomerates, are throughout this area. Representative formations in this area are the Silver Plume and Pikes Peak granites, San Juan Volcanics, and Mancos Shale. Many of the

highest mountain ranges were reshaped by glaciation during the Pleistocene. Alluvial fans at the base of the mountains are recharge zones for local basin and valley fill aquifers. They also are important sources of sand and gravel.

The dominant soil orders in this MLRA are Mollisols, Alfisols, Inceptisols, and Entisols. The soils in the area dominantly have a frigid or cryic soil temperature regime and an ustic or udic soil moisture regime. Mineralogy is typically mixed, smectitic, or paramicaceous. In areas with granite, gneiss, and schist bedrock, Glossocryalfs (Seitz, Granile, and Leadville series) and Haplocryolls (Rogert series) formed in colluvium on mountain slopes. Dystrocryepts (Leighcan and Mummy series) formed on mountain slopes and summits at the higher elevations. In areas of andesite and rhyolite bedrock, Dystrocryepts (Endlich and Whitecross series) formed in colluvium on mountain slopes. In areas of sedimentary bedrock, Haplustolls (Towave series) formed on mountain slopes at low elevations and with low precipitation. Haplocryolls (Lamphier and Razorba series), Argicryolls (Cochetopa series), and Haplocryalfs (Needleton series) formed in colluvium on mountain slopes at high elevations.

## LRU notes

This site is part of the RM-2 sub-resource area. This site is found on the west side of Sangre de Cristo mountains, Tusas Mountains (southern San Juan mountains) and Jemez Mountains.

## Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA AgHandbook 296.

## Ecological site concept

This site occurs on mountains, terraces, plains and alluvial fans on the deep soils and found on ridges where the soils are shallow. Slopes range from 5 to 40 percent. Elevation ranges from 7,200 to 10,000 feet above sea level.

Two soil types have been correlated to this site. The most common soil is deep (>60" in depth); clayey-skeletal; and parent material is igneous and metamorphic rocks. The other soil is shallow (<20" in depth); clayey; and parent material is sandstone and shale. Surface textures range from cobbly loam, stony loam, very cobbly loam or very cobbly sandy loam. Subsoils range from extremely cobbly sandy clay loam, to extremely gravelly clay.

This ecological site used to have the ID number of R048BY002NM in RM-2 subresource area in 1982.

## Associated sites

R048AY014NM	<b>Mountain Valley Dry</b> This site occurs on broad valleys, overflow areas adjacent to intermittent streams and depressional areas subject to run-in of moisture from adjacent sites. However, this site is often highly dissected, and run-in is non-effective. Slopes range from 1 to 8 percent. Elevation ranges from 7,200 to 8,000 feet above sea level. The soils are deep to very deep and well drained. Surface textures is usually clay loam. Subsoils is usually clay. This ecological site used to have the ID number of R048BY007NM in RM-2 subresource area in 1982.
R048AY015NM	<b>Mountain Shale Dry</b> This site occurs on nearly level to sloping landscapes below steeper slopes of interbedded sandstone and shale. Slopes range from 1 to 35 percent. Elevation ranges from 6,800 to 7,700 feet above sea level. Soil depths range from shallow to moderately deep. Surface textures are generally clay loam and are very thin. Subsoils are generally clays. The amount of surface skeletal fragments varies from no fragments to very channery and erosion pavement forms as the surface is eroded. Permeability is slow to very slow. This ecological site used to have the ID number of R048BY008NM in RM-2 subresource area in 1982.

## Similar sites

R048AY255CO	<b>Pine Grasslands</b> This site occurs on structural benches, dip slopes, hills, mesas and canyon benches. Slopes is between 0 to 30%. This site has more than one soil concept correlated to it. The concepts are shallow soils (<20 " deep) and soils that are greater than 20" deep. Soils are derived from eolian deposits from sandstone; alluvium, colluvium or slope alluvium from sandstone and shale; or residuum from igneous and metamorphic rock. Soil surface texture is loam, sandy loam or gravelly loam with fine-loamy or fine-silty textured subsurface for the deep soils and loamy and loamy-skeletal for the shallow soils. It is a Ponderosa Pine – Arizona Fescue community. It has a typic ustic moisture regime and frigid temperature regime. The effective precipitation ranges from 16 to 20 inches.
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**Table 1. Dominant plant species**

Tree	(1) <i>Pinus ponderosa</i>
Shrub	Not specified
Herbaceous	(1) <i>Festuca arizonica</i> (2) <i>Pascopyrum smithii</i>

## Physiographic features

This site occurs on mountains, terraces, plains and alluvial fans on the deep soils and found on ridges where the soils are shallow. Slopes range from 5 to 40 percent. Elevation ranges from 7,200 to 10,000 feet above sea level.

**Table 2. Representative physiographic features**

Landforms	(1) Mountain (2) Terrace (3) Plain (4) Alluvial fan (5) Ridge
Runoff class	Low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	7,200–10,000 ft
Slope	5–40%
Aspect	Aspect is not a significant factor

## Climatic features

The climate is characterized by cold, wet winters in which more than 50 percent of the total annual precipitation is received during the winter. The balance of the precipitation is received in the summer months, some of it in the form of high intensity thunderstorms. Average annual precipitation is about 22 inches but ranges from 16 to 30 inches and yearly fluctuations are common.

The average frost-free period is about 80 days but ranges from 60 days at the highest elevations to 110 days at the lowest elevations; however, the period lengths vary. The average last killing frost in the spring occurs about June 10th. The average first killing frost in the fall occurs about September 20th. Average annual air temperature is 22.6 degrees F in January and 64.5 degrees F in July with extremes ranging from -40 degrees F to 95 degrees F.

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	49-123 days
Freeze-free period (characteristic range)	90-150 days
Precipitation total (characteristic range)	16-30 in
Frost-free period (actual range)	47-125 days

Freeze-free period (actual range)	83-157 days
Precipitation total (actual range)	16-30 in
Frost-free period (average)	84 days
Freeze-free period (average)	121 days
Precipitation total (average)	23 in

### Climate stations used

- (1) RED RIVER [USC00297323], Questa, NM
- (2) LOS ALAMOS [USC00295084], Los Alamos, NM
- (3) LOS ALAMOS 13 W [USW00003062], Jemez Springs, NM
- (4) JEMEZ SPRINGS [USC00294369], Jemez Springs, NM
- (5) WOLF CANYON [USC00299820], Jemez Springs, NM

### Influencing water features

None

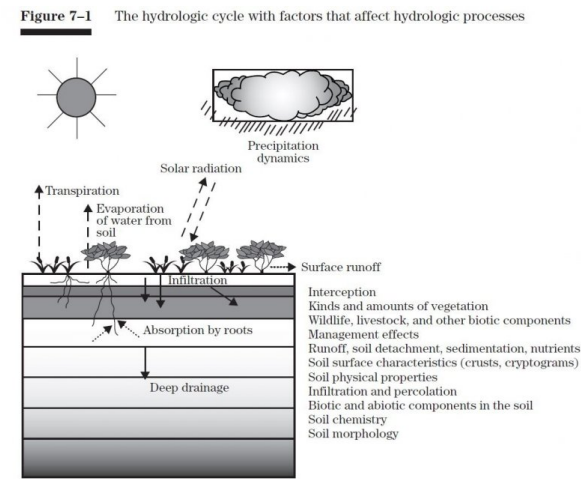


Figure 8.

### Soil features

Two soil types have been correlated to this site. The most common soil is deep (>60" in depth); clayey-skeletal; and parent material is igneous and metamorphic rocks. The other soil is shallow (<20" in depth);clayey; and parent material is sandstone and shale. Surface textures range from cobbly loam, stony loam, very cobbly loam or very cobbly sandy loam. Subsoils range from extremely cobbly sandy clay loam, to extremely gravelly clay.

Soils correlated to this site:  
 Clayey-Skeletal & Deep  
 Trampas

Shallow & Clayey:  
 Vamer

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous and metamorphic rock (2) Slope alluvium–igneous and metamorphic rock (3) Alluvium–sandstone and shale (4) Residuum–sandstone and shale
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Surface texture	(1) Very cobbly, cobbly sandy loam (2) Very cobbly, cobbly, stony loam
Family particle size	(1) Clayey-skeletal (2) Clayey
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	7–80 in
Surface fragment cover <=3"	10–20%
Surface fragment cover >3"	15–30%
Available water capacity (Depth not specified)	1.5–3.5 in
Calcium carbonate equivalent (Depth not specified)	0%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–1
Soil reaction (1:1 water) (Depth not specified)	6.1–7.3
Subsurface fragment volume <=3" (Depth not specified)	15–35%
Subsurface fragment volume >3" (Depth not specified)	15–40%

## Ecological dynamics

This is a savannah site with a cool-season grass understory and an overstory of predominantly by ponderosa pine. Woody canopy in reference condition does not exceed 30 percent.

Below is a State and Transition Model diagram to illustrate the “phases” (common plant communities), and “states” (aggregations of those plant communities) that can occur on the site. Differences between phases and states depend primarily upon observations of a range of disturbance histories in areas where this ESD is represented. These situations include grazing gradients to water sources, fence-line contrasts, patches with differing dates and intensities of fire, herbicide treatment, etc. Reference State 1 illustrates the common plant communities that probably existed just prior to European settlement.

The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the detailed narratives that follow the diagram.

The plant communities shown in this State and Transition Model may not represent every possibility but are probably the most prevalent and recurring plant communities. As more monitoring data are collected, some phases or states may be revised, removed, and/or new ones may be added.

The state and transition model was added to comply with the provisional ecological site instruction. It is a very general model.

## State and transition model

## R048AY010NM Pine Grassland

### State 1: Reference State

#### 1.1 Reference Plant Community

Patchy mature Ponderosa with less cover in the understory trees. Dense grass and forb cover consisting mainly of Arizona fescue, Columbia needlegrass, and mountain muhly.

1.2A

#### 1.2 Light Ponderosa with Shrub cover

Mature scattered Ponderosa canopy with mountain big sagebrush, and Gambel oak, Understory species are Arizona fescue and mountain muhly

1.1A

1.2B

1.3A

#### 1.3 Mature Ponderosa Pine

Mature scattered Ponderosa canopy with mountain big sagebrush, Gambel oak, and rabbitbrush

1.3B

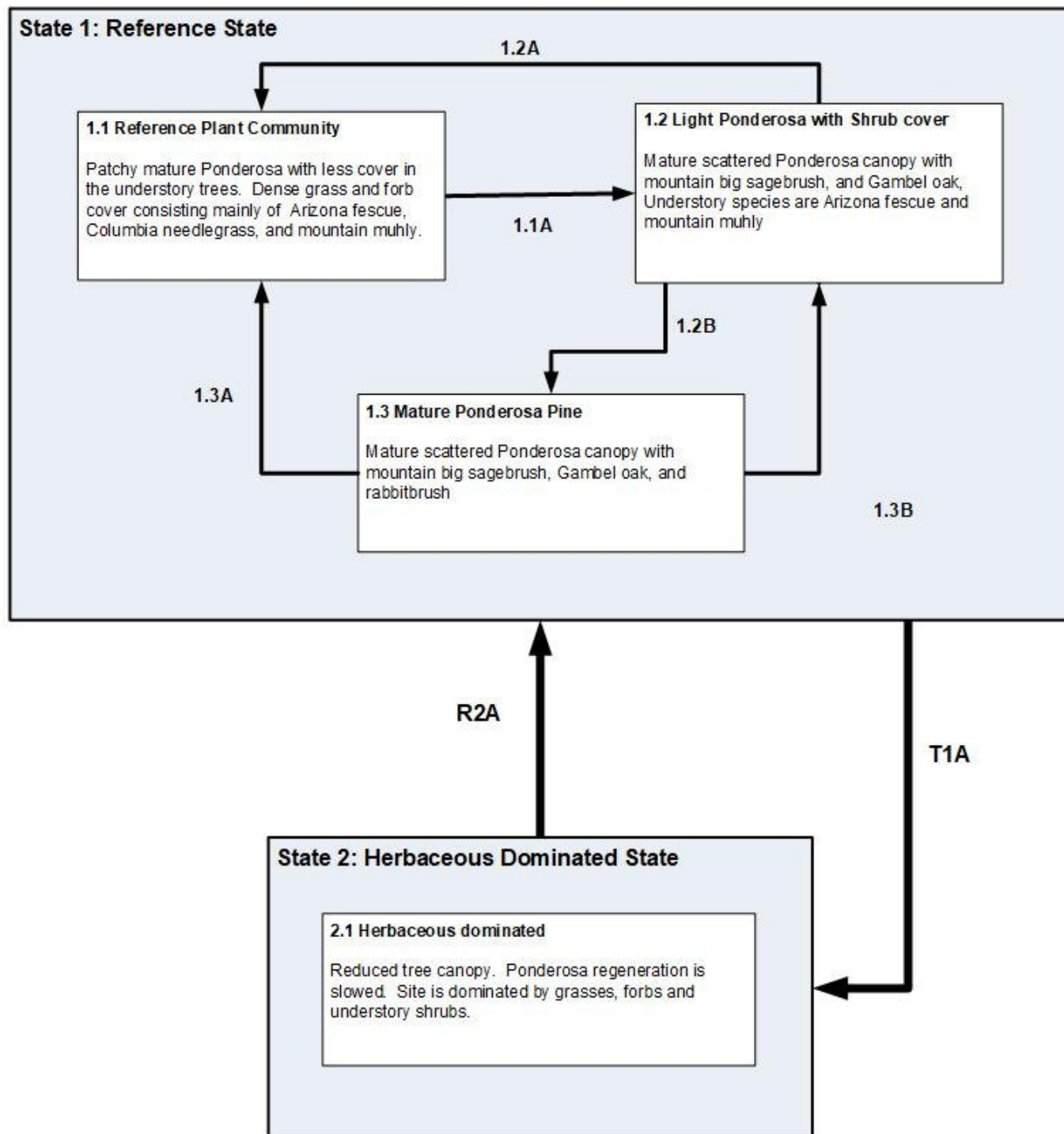
R2A

T1A

### State 2: Herbaceous Dominated State

#### 2.1 Herbaceous dominated

Reduced tree canopy. Ponderosa regeneration is slowed. Site is dominated by grasses, forbs and understory shrubs.



## Legend

1.1A, 1.2B – time without disturbance, wetter cycles, tree establishment, lack of fire

1.2A, 1.3A – disturbance, large scale fire, insect and diseases of trees, prolonged drought

1.3B – small scale fire and disturbances, insect and diseases of trees, prolonged drought

T1A – catastrophic wildfire

R2A – Seedling plantings, time without disturbance

### State 1

#### Reference State

□ This state represents the natural range of variability on the site. The plant communities within the reference state were shaped and maintained by disturbances such as grazing, browsing, drought, wet years, and fire. The removal or alteration of these processes can cause a shift to an alternative state.

### Community 1.1

#### Reference Plant Community

This is a savannah-type site with a cool-season grass understory and overstory predominantly is ponderosa pine. Rocky mountain juniper and Gambel oak are minor components of the overstory. Shrubs are a minor component on the site. Forbs, when in bloom, are usually detectable. Trees, shrubs and half-shrubs average 12% canopy cover. Other species that could appear on this site include: Indian ricegrass, little bluestem, spike muhly, sleepygrass, sideoats grama, mariposa lily, geranium, thistle, Louisiana sagewort, fringed sagewort, alumroot, skunkbush sumac, currant, snowberry and serviceberry.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	635	710	1025
Forb	80	90	130
Shrub/Vine	80	90	130
Tree	5	10	15
<b>Total</b>	<b>800</b>	<b>900</b>	<b>1300</b>

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	31-35%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	23-27%
Surface fragments >0.25" and <=3"	0%

Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	30-34%

Figure 10. Plant community growth curve (percent production by month).  
 NM3302, R048AY010NM Pine Grassland HCPC. R048AY010NM Pine  
 Grassland HCPC Grassland overstorey by ponderosa pine with minor  
 components of shrubs and forbs. .

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	5	5	10	25	30	15	7	0	0

## Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				135–180	
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	135–180	–
2				72–108	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	72–108	–
3				72–108	
	pine dropseed	BLTR	<i>Blepharoneuron tricholepis</i>	84–126	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	84–126	–
	muttongrass	POFE	<i>Poa fendleriana</i>	84–126	–
4				45–90	
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	45–90	–
5				27–63	
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	27–63	–
7				27–63	
	Thurber's fescue	FETH	<i>Festuca thurberi</i>	27–63	–
8				27–45	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	27–45	–
9				27–63	
	Grass, native	2GN	<i>Grass, native</i>	27–63	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–45	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	0–45	–
	sedge	CAREX	<i>Carex</i>	0–27	–
<b>Forb</b>					
12				30–75	
	Forb, native	2FN	<i>Forb, native</i>	27–63	–
	castilla	CAST1	<i>Castilla</i>	0–63	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–63	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	0–63	–
	floribunda	FRIGF2	<i>Frigeron</i>	0–63	–



	buckwheat	ERIOG	<i>Eriogonum</i>	0–63	–
<b>Shrub/Vine</b>					
13				10–45	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–45	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–45	–
14				10–45	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	1–27	–
	rubber rabbitbrush	ERNAN5	<i>Ericameria nauseosa ssp. nauseosa var. nauseosa</i>	1–27	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	0–27	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–27	–
<b>Tree</b>					
16				1–50	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	1–45	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–27	–

## Animal community

### Grazing:

Approximately 90 percent of the vegetation produced on this site are suitable for grazing or browsing by domestic livestock and wildlife. Grazing distribution need not be a problem as long as water and salt are adequately located.

Deterioration of the potential plant community is indicated by a decrease in Arizona fescue, western wheatgrass, prairie junegrass, muttongrass and pine dropseed. Species that increase include blue grama, galleta, sleepygrass, rabbitbrush and broom snakeweed. A planned grazing system with periodic grazing and rest is best to maintain the natural balance between plant species and to maintain high productivity.

In addition to domestic livestock, this site is well suited to deer, elk, turkey and small mammals.

### Habitat for Wildlife:

This site provides habitats which support a resident animal community that is characterized by mule deer, red fox, porcupine, Colorado chipmunk, northern pocket gopher, deer mouse, great horned owl, slicker, turkey and mountain chickadee. These sites are used for breeding by western bluebird, Brewer's blackbird, robin and violet-green swallow. These sites are important wintering areas for elk.

## Recreational uses

This site is well suited to picnicking, camping, hunting and horseback riding. The natural beauty of the site is enhanced by the close proximity to high-mountain settings.

## Wood products

Ponderosa pine produced on this site is suitable for timber uses. However, quantities of wood products are limited due to low regeneration. This site should not be considered a major source of wood products on a sustained basis.

## Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index-----Ac/AUM  
100 - 76-----2.2 – 3.0

75 – 51-----2.8 – 5.0  
50 – 26-----4.8 – 9.0  
25 – 0-----9.0+

Inventory data references

Data collection for this site was done in conjunction with the progressive soil surveys within the State of New Mexico. This site is found in the following soil survey areas: Taos, Sante Fe, Sandoval, Los Alamos, Rio Arriba, Santa Fe National Forest (Coyote, Cuba, Jemez Springs, and Espanola Ranger Districts) and Carson National Forest

These site descriptions were developed as part of a Provisional ESD project using historic soil survey manuscripts, available range site descriptions.

Other references

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Contributors

Don Sylvester  
John Tunberg

Approval

Kirt Walstad, 3/05/2024

Acknowledgments

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

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	05/10/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

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

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

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

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

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

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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):**
- 

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:**
-