

Ecological site R048AY011NM Subalpine Grassland Dry

Last updated: 3/05/2024
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General information

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

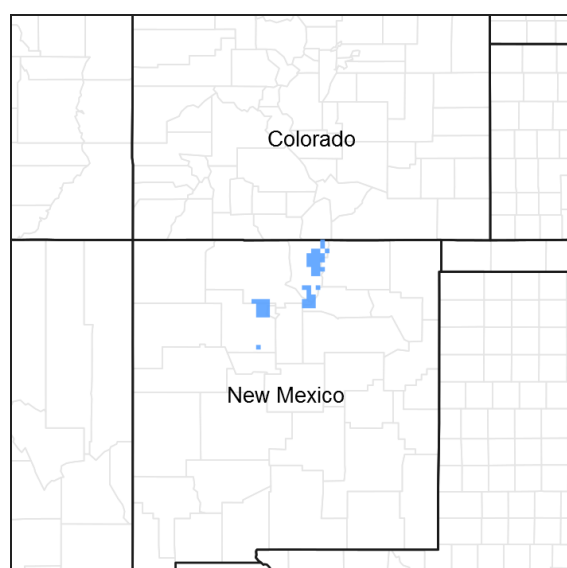


Figure 1. Mapped extent

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 high mountain tops above and extending down into parks within the spruce-fir zone. Aspen groves and colonies of Gambel oak may be scattered throughout the site. The landscape ranges from rolling to steep with side slopes ranging from 5 to 45 percent. Elevation ranges from 9,000 to 12,000 feet above sea level.

The soils are deep but may be high in surface cobbles and stones and give the impression of being shallow. Surface textures range from cobbly and/or gravelly loams and very cobbly sandy loam. Subsoils textures range from loam, clay loam and silt loams are filled with rock fragments. Family particle size class is loamy-skeletal.

This ecological site used to have the ID number of R048BY003NM in RM-2 subresource area in 1982.

Associated sites

R048AY014NM	Mountain Valley Dry 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.
F048AY908CO	Mixed Conifer This site is found mostly commonly on mountain slopes. Soils are moderately deep to very deep (20 to 60+ inches). Soil surface textures are loam, very gravelly sandy loam, very stony sandy loam, stony sandy loam, stony loam, very stony loam, very cobbly loam or gravelly fine sandy loam. Subsurface textures can be loamy-skeletal or sometimes fine-loamy. It is usually ustic udic or typic udic and cryic. It is a Mixed Conifer community with subalpine fir, white fir, and Douglas fir intermixed. The effective precipitation ranges from 20 to 40 inches.

Similar sites

R048AY001NM	Subalpine Grassland This site takes in mountain parks and other open grasslands generally within the spruce-fir zone. In some places it is interspersed with aspen groves. This site is located near timberline extending down to the ponderosa pine zone. Topography is mostly rolling to moderate slopes, but some areas are steep. Slopes are between 2 to 20 percent, but can range up to 40 percent. Elevation ranges from 9,000 feet to near timberline, which is approximately 11,400 feet above sea level. The soils are well drained, deep to very deep. The surface texture is loam, cobbly loam or gravelly loam. There may be large numbers of rock fragments throughout the profile as this soil has multiple soil family particle sizes correlated to it. The soils have moderate to moderately slow permeability. Runoff is moderate. Available water-holding capacity is low to medium. The effective rooting depth is 20 inches or more. On the soil Hillery which is correlated to this site, it occurs on lava flows, mesas and plains. Hillery is also above 40 inches of precipitation which is higher than the concept of this site. Surface soil textures are silt loam, and stony loam.
R048AY250CO	Subalpine Loam This site occurs on hills, mountain-slopes, and mountains. Slopes is between 1 to 30%. Soils are deep to very deep (20 to 60+ inches). Soils are derived from colluvium and alluvium from volcanic rock; complex landslide deposits from igneous, metamorphic, and sedimentary rock; and slope alluvium, colluvium, residuum, alluvium or complex landslide deposits from sandstone and shale or shale. Soil surface texture is loam with loamy textured subsurface. It is a mountain big sagebrush – Thurber's Fescue community. It has an ustic udic/typic udic moisture regime and cryic temperature regime. The effective precipitation ranges from 20 to 30 inches.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Festuca arizonica</i> (2) <i>Festuca thurberi</i>

Physiographic features

This site occurs on high mountain tops above and extending down into parks within the spruce-fir zone. Aspen groves and colonies of Gambel oak may be scattered throughout the site. The landscape ranges from rolling to steep with side slopes ranging from 5 to 45 percent. Elevation ranges from 9,000 to 12,000 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Mountain slope (3) Hill
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	9,000–12,000 ft
Slope	5–45%
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 32 inches but ranges from 25 to 40 inches and yearly fluctuations are common.

The average frost-free period is about 40 days but ranges from 30 days at the highest elevations to 90 days at the lowest elevations; however, the period lengths vary. The average last killing frost in the spring occurs about June 10th. 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)	30-90 days
Freeze-free period (characteristic range)	80 days
Precipitation total (characteristic range)	25-40 in
Frost-free period (actual range)	30-90 days
Freeze-free period (actual range)	80 days
Precipitation total (actual range)	25-40 in
Frost-free period (average)	40 days
Freeze-free period (average)	80 days
Precipitation total (average)	32 in

Climate stations used

- (1) WOLF CANYON [USC00299820], Jemez Springs, NM

Influencing water features

None

Figure 7-1 The hydrologic cycle with factors that affect hydrologic processes

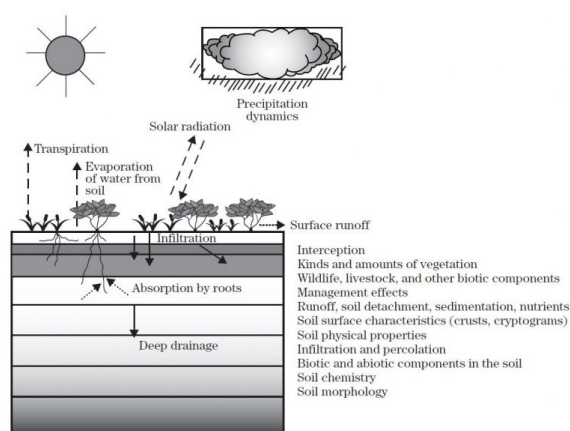


Figure 8.

Soil features

The soils are deep but may be high in surface cobbles and stones and give the impression of being shallow. Surface textures range from cobbly and/or gravelly loams and very cobbly sandy loam. Subsoils textures range from loam, clay loam and silt loams are are filled with rock fragments. Family particle size class is loamy-skeletal.

Soils correlated to this site:
Penitente, Ess and Quazar

Table 4. Representative soil features

Parent material	(1) Colluvium–rhyolite (2) Colluvium–granite and gneiss (3) Residuum–granite and gneiss (4) Colluvium–volcanic and metamorphic rock
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Surface texture	(1) Very cobbly sandy loam (2) Gravelly, cobbly, very cobbly loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately rapid to moderate
Soil depth	60–80 in
Surface fragment cover ≤3"	5–20%
Surface fragment cover >3"	5–40%
Available water capacity (Depth not specified)	2.5–4 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)	5.1–7.8
Subsurface fragment volume ≤3" (Depth not specified)	20–30%
Subsurface fragment volume >3" (Depth not specified)	15–30%

Ecological dynamics

Deterioration of the potential plant community is indicated by a decrease in Arizona fescue, mountain muhly, Columbia needlegrass, bluegrass spp., and mountain brome. Species that increase include sedges, Thurber fescue, bottlebrush squirreltail, forbs and woody species such as Gambel oak and quaking aspen. A planned grazing system with periodic grazing and rest during the grazing season is best to maintain the natural balance between plant species and to maintain high productivity.

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.

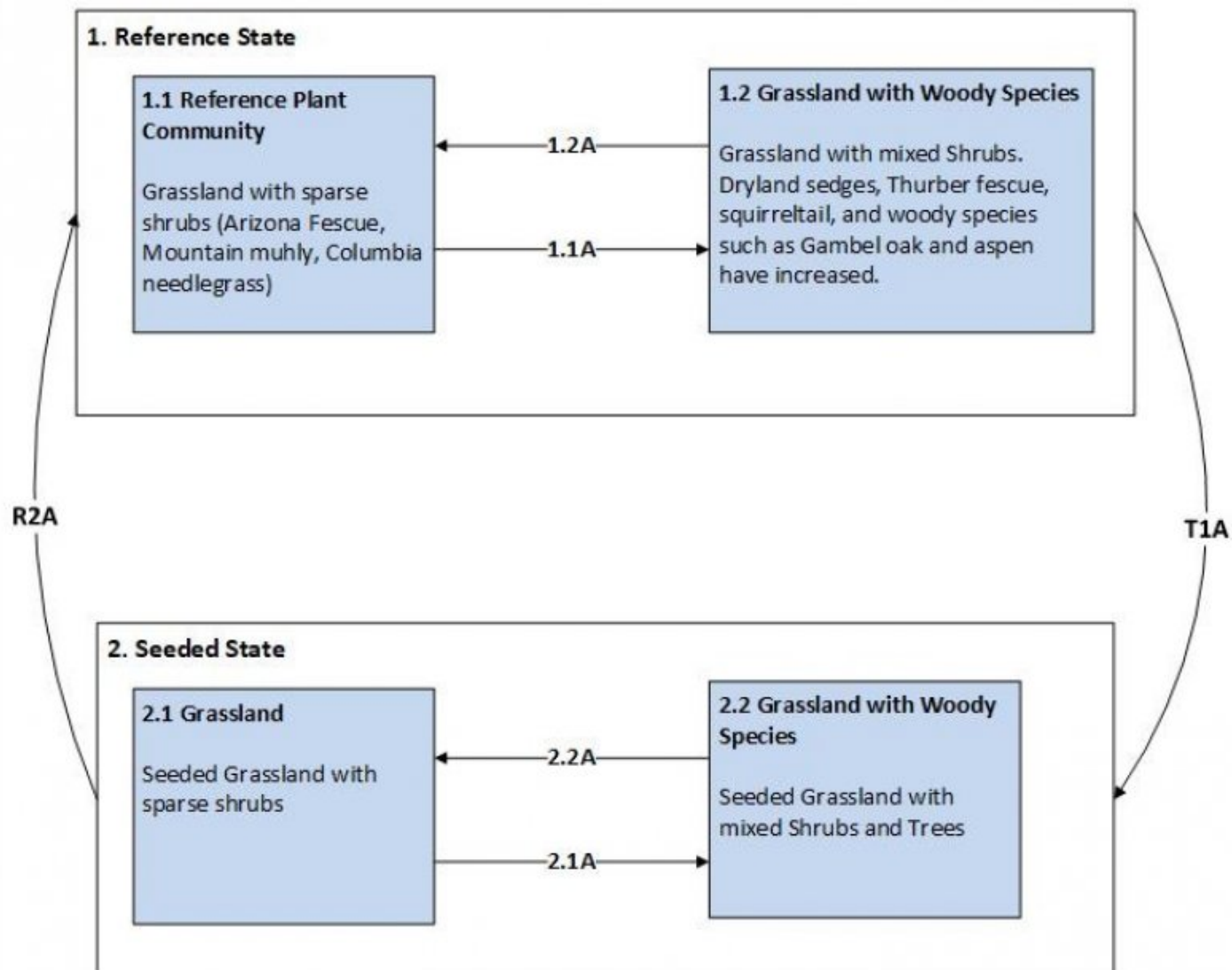
The major successional pathways within states, (“community pathways”) are indicated by arrows between phases. “Transitions” are indicated by arrows between states. The drivers of these changes are indicated in codes decipherable by referring to the legend at the bottom of the page and by reading the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

R048AY011NM Subalpine Grassland Dry



Legend

1.1A, 2.1A – lack of fire, lack of insect/pathogens, time without disturbance, drought and improper grazing
1.2A, 2.2A – fire, insect herbivory, pathogen presence, browsing of shrubs, and/or wetter climate cycles

T1A – Seeding

R2A – natives reestablished over extended time periods

State 1
Reference State

This ecological 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, rest, and fire. The removal or alteration of these processes can cause a shift to an alternative ecological state.

Community 1.1
Reference Plant Community

This is primarily a grassland site with scattered Gambel oak and other shrub colonies, aspen groves and occasional trees. Forbs are present throughout, but are a minor component on the site. Tree, shrub, and half-shrub canopy cover on this site average 5 percent. Other species that could appear on this site include: tufted hairgrass, Letterman needlegrass, sleepygrass, slender wheatgrass, redtop, alpine timothy, monkshood, dandelion, cow parsnips, geranium, wild rose, quaking aspen, elderberry, roseberry, Engelmann spruce and bristlecone pine.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	840	1260	1512
Forb	80	120	144
Shrub/Vine	80	120	144
Total	1000	1500	1800

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	40-50%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	30-40%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	5-15%

Figure 10. Plant community growth curve (percent production by month).
NM3303, R048AY011NM HCPC. R048AY011NM Subalpine Grassland Dry
HCPC Grassland 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 (%)
Grass/Grasslike					
1				375–525	

	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	375–525	–
	Thurber's fescue	FETH	<i>Festuca thurberi</i>	375–525	–
2				150–225	
	sedge	CAREX	<i>Carex</i>	150–225	–
3				75–105	
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	75–105	–
4				75–105	
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	75–105	–
5				75–105	
	muttongrass	POFE	<i>Poa fendleriana</i>	75–105	–
6				75–105	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	75–105	–
7				75–105	
	pine dropseed	BLTR	<i>Blepharoneuron tricholepis</i>	75–105	–
	spike muhly	MUWR	<i>Muhlenbergia wrightii</i>	75–105	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	75–105	–
	oatgrass	DANTH	<i>Danthonia</i>	75–105	–
8				45–105	
	Grass, native	2GN	<i>Grass, native</i>	45–105	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	45–105	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	45–105	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	45–105	–
Forb					
9				45–120	
	common yarrow	ACMI2	<i>Achillea millefolium</i>	45–120	–
	larkspur	DELPH	<i>Delphinium</i>	45–120	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	45–120	–
	lupine	LUPIN	<i>Lupinus</i>	45–120	–
	clover	TRIFO	<i>Trifolium</i>	45–120	–
	Forb, native	2FN	<i>Forb, native</i>	45–120	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	15–45	–
Shrub/Vine					
10				15–45	
	Gambel oak	QUGA	<i>Quercus gambelii</i>	15–45	–
11				15–45	
	serviceberry	AMELA	<i>Amelanchier</i>	15–45	–
	shrubby cinquefoil	DAFR6	<i>Dasiphora fruticosa</i>	15–45	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	15–45	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	15–45	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	15–45	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	15–45	–

Animal community

Grazing:

Approximately 90 percent of the vegetation produced on this site are suitable for use by domestic livestock and wildlife. Season of use is limited to late spring through early fall due to heavy winter storms. Due to the steepness of slope and season of use, this site is better adapted for use by yearlings than by cows and calves. Herding to and from these sites when adjacent to heavy woodlands insures utilization of the site. Herding, salting and trail construction can improve grazing distribution of the site.

Deterioration of the potential plant community is indicated by a decrease in Arizona fescue, mountain muhly, Columbia needlegrass, bluegrass spp., mountain brome and sheep fescue. Species that increase include sedges, Thurber fescue, bottlebrush squirreltail, forbs and woody species such as Gambel oak and quaking aspen. A planned grazing system with periodic grazing and rest during the grazing season is best to maintain the natural balance between plant species and to maintain high productivity.

This site is seasonally suited to elk and small mammals in addition to domestic livestock

Habitat for Wildlife:

This site provides habitats, which support a resident animal community that is characterized by Rocky Mountain bighorn, sheep, montane vole, yellow-bellied marmot, pika, mountain bluebird and white-tailed ptarmigan. There is seasonal use by elk, deer, prairie falcon, white-crowned sparrow and rosy finches.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations

Soil Series-----Hydrologic Group

Ess-----B

Penitente-----B

Recreational uses

This site occurs in a beautiful mountain setting with expansive views of lower-lying areas. However, the site is limited in its accessibility.

Wood products

This site produces no significant amounts of wood products on a sustained yield basis. Harvesting of wood products is limited by the location of the site.

Other products

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Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index-----Ac/AUM

100 - 76-----2.1 – 2.7

75 – 51-----2.6 – 4.1

50 – 26-----4.0 – 8.1

25 – 0-----8.1+

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

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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
Elizabeth Wright
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:**

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:**
