Ecological site F039XA007NM
Montane slopes
12-18"

Accessed: 09/25/2026

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.

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa* (2) *Pinus edulis*
Shrub	Not specified
Herbaceous	(1) *Muhlenbergia montana* (2) *Bouteloua curtipendula*

Physiographic features

The site varies in topographic location. The site can typically be found on ridges and canyon side slopes. It can also be found on hills, alluvial fans, and mountain canyons. The slopes range from 5 to 60%.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Ridge (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,980 – 3,120 m
Slope	10 – 60 %
Aspect	N

Climatic features

The weather stations used for estimating average climate (precipitation, temperature, and freeze- and frost-free days) is: Adobe Ranch; Beaverhead Ranger Station (USFS); Datil; and Horse Springs, NM. These stations are contained in the Western Regional Climate Center database. The averages contain incomplete data due to breaks in weather record keeping.
The weather stations are within climatic division NM-04, Southwestern Mountains. They are located within MLRA 35 and 39, with a precipitation zone of 12 to 18 inches per year.
Most of the precipitation occurs during the summer months. The sites are subjected to winter snowfall and very cold temperatures as well. Tabular data is derived from the climate summarizer for the weather stations identified. Average annual minimum temperature is 28.3 degrees with a maximum of 66.2 degrees.

Table 3 Representative climatic features

Frost-free period (average)	270 days
Freeze-free period (average)	290 days
Precipitation total (average)	460 mm

Influencing water features

None, except for down-slope runoff and retention of snow-pack on northerly aspects. This site is not influenced by wetlands or free-flowing streams or seeps.

Soil features

The characteristic soils are Typic Argiborolls and the Tolman, Coni, Smilo, and Adman series.
The Tolman series occurs in a complex soil intermixed with rock outcrops. It is characterized as an extremely cobbly loam, typically found in stable areas between the rock outcrops. It is a loamy-skeletal, mixed, mesic, Lithic Argiboroll. This soil is derived from volcanic tuff.
Typic Argiborolls are extremely variable, derived from colluvium originating from tuff, basalt, and sandstone. It generally occurs on side slopes near canyon bottoms with the Tolman series in the upper reaches of the slope, on north and east aspects.
The Coni series is formed in residuum derived from tuff. It is located usually along piedmont ridges. It is a loamy, mixed, Lithic Argiboroll.
The Smilo series is formed in residuum derived from basalt. It is on alluvial fans in areas of basalt flows. It is a fine, mixed, superactive, frigid Aridic Argiustoll.
The Adman series is formed in residuum derived from basalt and basaltic tuff. It is on basalt flows, hills, and sideslopes. It occurs in association with the Smilo series, and it is a clayey, mixed, superactive, frigid Aridic Lithic Argiustoll.

Table 4. Representative soil features

Surface texture	(1) Extremely cobbly loam (2) Stony sandy loam (3) Gravelly
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	10 − 150 cm

Surface fragment cover <=3"	30 – 40 %
Surface fragment cover >3"	10 – 30 %
Available water capacity (0-101.6cm)	0.13 – 0.36 cm
Electrical conductivity (0-101.6cm)	Not specified
Subsurface fragment volume <=3" (Depth not specified)	20 %
Subsurface fragment volume >3" (Depth not specified)	40 – 50 %

Ecological dynamics

This ecological site's plant communities are influenced by elevation, climate, and edaphic features. The site is driven by aspect and generally occurs on north aspects.

This ESD details the plant community dynamics at the mid-elevation, for north aspects only.

At warmer and dryer (lower elevations) locations of this ecological site, ponderosa pine remains in the overstory, although woodlands species (twoneedle pinyon, juniper, gray oak) may occur in greater density.

At cooler and wetter (higher elevations, northerly aspects), locations, this site may support a mixture of ponderosa pine, Gambel oak, and Douglas fir with incidental occurrences of southwestern white pine. Quaking aspen may also be found on certain slopes at the highest elevations along narrow drainages or seeps. Typically the site is comprised of a ponderosa pine-twoneedle pinyon-Douglas fir plant community. Alligator juniper varies in density but occurs throughout the site. Gambel oak may occur in greater proportion on northeast aspects.

Natural and prescribed fires are principal drivers in the plant community dynamics. Drought and disease also play roles in changing plant community structure and composition, as well as being a source of fire fuel.
Prior to European settlement, fires would have been understory burns that consumed ground fuels and thinned out seedlings and saplings while pruning young to mid-aged trees. This type of burn would have maintained a savannah or park-like appearance. Crown fires indicate a disrupted fire cycle caused by livestock grazing and over-accumulation of light (leaves/needles) and heavy fuels (wood fiber). Higher densities of shrubs and younger-age trees would create the ladder fuels necessary for crown fires.
Some of the plant communities identified in this ESD are based on field data. For the estimated plant communities, composition and production of plant species and other related data were reconstructed from either similar plant communities or historical accounts and based on ecological principles, historical records, or anecdotal evidence.
Photographs herein may depict plant communities of similar structure and function to those described but with minor differences in species composition.
State 1, Plant Community 1 (PC1) is the reference community (RC) of this ecological site. It reflects pre-European settlement conditions. Natural fires are associated with this state and likely occur with a relatively high frequency. The frequency may average between 5 and 20 years, and more frequently if ground fuels (herbaceous plants) and climatic conditions allow for naturally ignited fires to expand. Crown fires are not expected to be common in this state due to the fairly open nature of the stand, but they may be incidental occurrences affecting small groups of trees on steeper slopes or in drainages.
PC1 is dominated by ponderosa pine with pinyon and Douglas fir as subdominant species. Alligator juniper and Gambel oak may be common occurrences in the stands. This state is sustained through periodic natural fires and plant succession. Shifts in the plant community leading to PC2, PC3, and PC4 are a result from the effects of fire, disease, or tree cutting. Plant succession will return the site

to PC1.
State 2 is a deteriorated state caused by heavy livestock grazing and a disruption of the natural fire regime. Douglas fir and pinyon increases along with fire hazard severity. Crown fires are likely in this state. Understory species density is reduced, dominated by warm-season plants with remnants of cool-season species. PC5 is the prevalent plant community in State 2. PC5 shifts to PC6, PC7, and PC8 through catastrophic fire, drought and disease, heavy grazing, and plant succession.
State 3 is an intensively managed state which generally depicts the present plant community dynamics in some of the map units. This state involves a moderate level of grazing and both prescribed and natural fires. Gambel oak and other shrubs are codominants.

Decreases in pinyon and Douglas fir densities occur with a greater fire frequency.
PC9 is an intensively managed plant community (IPC), and it shifts to PC10 by crown fire. Livestock grazing may contribute to a build-up of younger-age classes of trees that provide the ladder fuels for a crown fire. A short prescribed-fire return interval (

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 9. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 10. Community 6.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 11. Community 7.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 12. Community 8.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 13. Community 9.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 14. Community 10.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

These areas have been grazed by livestock since the late 1800s. Slopes, with rock outcrops, vary enough that traversing the landscape may be difficult but not impossible for livestock. Both sheep and cattle with some pack and saddle stock have utilized the lands for over a century with varying intensity. Accessible areas close to developed water sources may be grazed heavier than more distant, less-watered areas. Very few natural water sources exist on these lands and consequently the grazing impact varies from excessive use to light or no use. Elk and deer forage on these lands, with elk having more effect on herbaceous and browse plants. Historical and current livestock use alters the understory vegetation composition, in turn affecting the fire regime for these lands. Natural fires are uncommon and

prescribed fires have been used to reduce accumulated fuels. Wild-fires do occur on these landscapes as a result of drought and severe fire weather conditions such as the Chance Fire in 2000 (Pelona Mountain). Stocking capacity in State 2 is low due to low forage production. The primary forage species in State 2 is blue grama. Sustainable grazing capacity can be achieved in State 3 with intensive range management. Competition for forage between livestock and wildlife can occur, especially on the cool-season grasses and desirable shrubs. Desirable shrub species are severely hedged and are decadent in State 2.

Hydrological functions

Coarse fragments (gravel, cobble, stone, boulder) and rock outcrops comprise a significant part of the ground cover that protects and binds the soil as well as modifies surface run-off. Rocky outcrops impede the force of surface runoff as well as channel water flow that influences vegetation and soil integrity. On the Faraway and Motoqua soil component within MLRA 39, exposed volcanic tuff channels water down-slope onto benches, drainage areas, and into rock crevices creating what appears to be an elevated moisture regime. The sites support ponderosa pine, Gambel oak, and in some cases, quaking aspen. Faraway and Motoqua soils support a twoneedle pinyon-oneseed juniper plant community in MLRA 35. Though the soil texture ranges from gravelly and very stony to extremely cobbly, it also includes loam and sandy loam textures. This soil can be subjected to sheet and gully erosion induced by surface run-off. In State 2, the soil is prone to degradation by heavy grazing that leads to reduced ground cover and accelerated run-off. State 1 and 3 plant communities maintain soil integrity and hydrological function through increased ground cover and nutrient cycling resulting from fires and decomposition.

Recreational uses

This site is not conducive to camping and firewood gathering due to steep terrain, except in localized areas where the terrain is gentle and suitable for vehicle access. The woodland plant community also provides thermal and nesting cover for wildlife and does hunting opportunities at certain times of the year. Much of the terrain is steep enough to provide wilderness-like recreation such as hiking and horseback riding as well as wildlife viewing. Scenic values are high, and changing the vegetative patterns across the site may change the scenic rating significantly.

Wood products

Many of the sites produce a substantial amount of wood fiber due in part to large diameter ponderosa pine and Douglas fir. States 1, 2, and 3 produce different volumes of wood fiber. Merchantable timber can be found in each of the states but the access to the sites may be cost- prohibitive and detrimental to the soil and watershed integrity. For States 2 and 3, wood volume is about 6 to 7.5 cords per acre on north slopes and about 6.5 to 8 cords per acre on south slopes. RC wood production ranges between 6 and 13.5 cords of wood per acre on north slopes due to larger trees. On south slopes, wood fiber would be about 6 to 10 cords per acre. Assuming a 150-year rotation and harvesting only the old trees in the stand, this would result in very low wood production.

Other information

Resident elk herds impact cool-season grasses and shrubs year-round. Livestock grazing continues as the primary use impacting plant community structure and diversity. The NRCS plant species list was consulted to determine the likelihood of a species occurring within these soil series. The Faraway and Motoqua soil components were inventoried in MLRA 39 while developing this ESD, with portions comparable to the Breaks/Hills Ecological Site (F035XG003NM), although, alligator juniper occurs as a minor component in MLRA39. Alligator juniper was not present on the Breaks/Hills site. A portion of the Faraway and Motoqua soil component within Map Unit 471 supports a ponderosa pine and Gambel oak plant community mixed with a pinyon-alligator juniper-gray oak component where elevation, aspect, and run-on soil moisture create a wet micro-site. Within map unit 472 near the Continental Divide, the Abrazo component is mixed with the Faraway and Motoqua components and also supports a ponderosa pine plant community mixed with pinyon and alligator juniper. This site is also located on north aspects and appears to receive higher moisture levels in localized situations due to the higher elevation and proximity to Continental Divide and associated edaphic features.

Contributors

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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	
Approved by	
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:**

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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:

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

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

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

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

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17. **Perennial plant reproductive capability:**
