

Ecological site F070AY021NM

Pinus edulis-Juniperus monosperma/Quercus gambelii/Bouteloua
curtipendula

Last updated: 9/12/2023
Accessed: 05/12/2025

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.

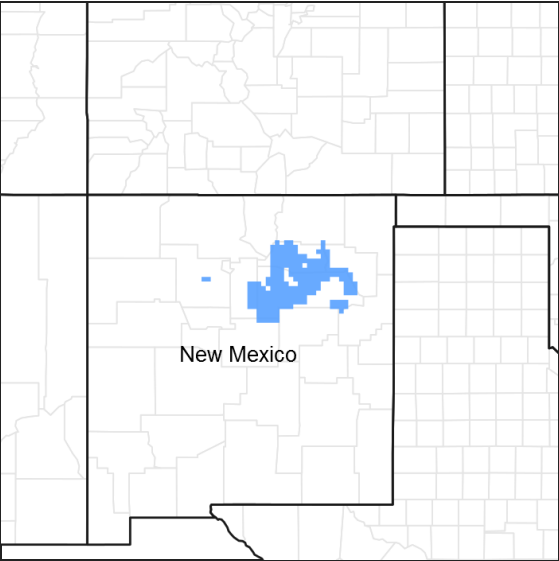


Figure 1. Mapped extent

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.

Ecological site concept

This site is found on sideslopes on mesas, hills, and on valley sides. Slopes range from 10 to 35 percent. Soils are shallow to sandstone bedrock. Surface textures often have gravelly or very gravelly modifiers.

This site correlates to the Shallow Ecological Site Group (GX070A01XESG02).

Similar sites

GX070A01X013	Lithic Sandstone The Lithic Sandstone site is specific to LRU 70A.1.
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Table 1. Dominant plant species

Tree	(1) <i>Pinus edulis</i> (2) <i>Juniperus monosperma</i>
Shrub	(1) <i>Quercus gambelii</i>
Herbaceous	(1) <i>Bouteloua curtipendula</i> (2) <i>Poa fendleriana</i>

Physiographic features

This site is found on sideslopes on mesas, hills, and on valley sides. Slopes tend to be steep. Elevation ranges from 6,500 to 7,500 feet. This site is not aspect driven, but at lower elevations, it is more predominant on north/northeast facing slopes, and at higher elevations, it tends toward south/southwest aspects.

Table 2. Representative physiographic features

Landforms	(1) Valley side (2) Hill (3) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–2,286 m
Slope	10–35%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area can be classified as “semi-arid continental”.

Precipitation averages 14 to 16 inches. Seventy seven percent of the year’s moisture normally falls during the period of May through October. Practically all of it is brought by brief afternoon and evening thunderstorms. In July and August, normally the wettest months of the year, one can expect about one day in five when rainfall exceeds one-tenth inch. Early spring precipitation in May benefits the cool-season plants. Winter precipitation, supplying 24 percent of the year’s moisture, normally has no more than two days a month with as much as one-tenth inch of moisture. Much of the winter precipitation falls as snow.

Air temperatures vary from a monthly mean of 20 degrees F in January to 69 degrees F in July. Daily high temperatures average in the 80’s and low 90’s during the summer. Winter low temperatures fall below the freezing mark much of the time from November through March with minimum temperatures approaching 25 degrees F below zero. Dates of the last killing frost may vary from May 9th through May 17th, and the first killing frost from September 27th to October 8th. The frost-free season ranges from 141 days to 153 days from early May to early October.

Wind velocities for the area average 10 to 12 miles per hour and prevail from the south and southwest. Generally, March is the windiest month. Strong winds during the spring cause rapid drying of the soil surface.

Nearby mountains to the west intercept much of the precipitation from the Pacific storms coming through this area during the winter. About 70 percent of the 14 to 16 inches of annual precipitation falls in the form of rainfall during the frost-free season. About 40 percent of the annual precipitation benefits cool-season plants, 50 percent benefits warm-season plants and 10 percent falls during the season of plant dormancy. Relative humidity is moderately low. The sun shines approximately 75 percent of the time.

Climate data was obtained from <http://www.wrcc.sage.dri.edu/summary/climsmnm.html> web site using 50 percent probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

Table 3. Representative climatic features

Frost-free period (average)	149 days
Freeze-free period (average)	171 days
Precipitation total (average)	406 mm

Influencing water features

This is an upland site, and is not associated with water features or wetlands. During heavy rain events, this site may receive run-on moisture from landforms above and contribute runoff to landforms below.

Soil features

These soils are well drained and shallow over sandstone. Surface textures are gravelly or very gravelly. Available water-holding capacity is low.

Table 4. Representative soil features

Surface texture	(1) Very gravelly fine sandy loam (2) Gravelly very fine sandy loam (3) Stony clay
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	25–102 cm
Surface fragment cover <=3"	5–15%
Surface fragment cover >3"	5–15%
Available water capacity (0-101.6cm)	7.62–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	10–30%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4

Ecological dynamics

The typical Reference Plant Community is dominated by an overstory of oneseed juniper and twoneedle piñon. The understory would consist of sideoats grama, muttongrass, blue grama, needlegrasses, and sedges. Oak spp. and mountain mahogany would also be present along with banana yucca, pricklypear, and other cacti.

Fire is a major component in this system with grass dominating the community shortly after fire, and shrubs becoming more dominant in the understory over time. Fire naturally occurred in this system every 15 to 40 years (Allen 1989). With fire suppression, the tree canopy becomes denser causing decreased understory growth. Eventually there may be little understory decreasing the sites resistance to erosion.

State and transition model

70A *Pinus edulis*-*Juniperus monosperma*

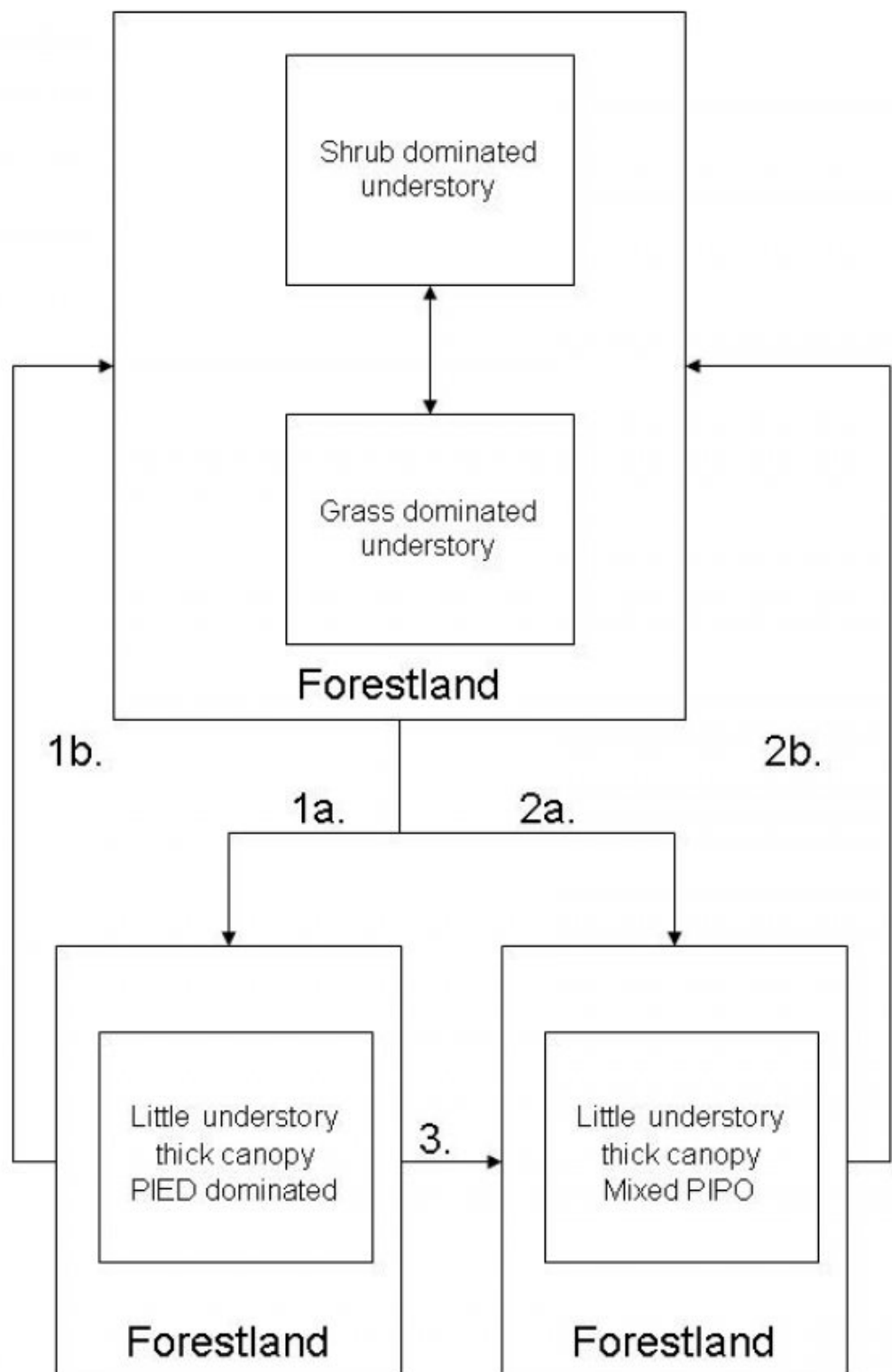
1a. Increase in overstory production.
Loss of herbaceous understory
Component due to changes in fire
Regime caused by fire suppression and overgrazing. Loss of herbaceous understory increases fire suppression and erosion.

1b. Restoration of herbaceous understory component through thinning of pinon cutting of ponderosa, possibly seeding, and proper grazing management.

2a. Increase in overstory production.
Loss of herbaceous understory
Component due to changes in fire
Regime caused by fire suppression and overgrazing. Loss of herbaceous understory increases fire suppression and erosion. A few wet years in which PIPO are established

2b. Restoration of herbaceous understory component through thinning, possibly seeding, and proper grazing management.

3. Wet year and fire suppression



This state represents the most ecologically stable conditions in terms of resistance to erosion. Moreover, this state has the highest potential for productivity and plant diversity.

Community 1.1

Grass Dominated Understory

This phase is characterized by an overstory of oneseed juniper and twoneedle piñon. The understory consists of sideoats grama, muttongrass, blue grama, needlegrasses, and sedges. Oak spp. and mountain mahogany would also be present along with banana yucca, prickly pear, and other cacti.

Forest overstory. Forest overstory consists primarily of twoneedle pinon and oneseed juniper. On hotter, dryer sites, oneseed juniper may increase.

Forest understory. Forest understory consists primarily of sideoats grama, muttongrass, needlegrasses, sedges, oak and mountain mahogany. As time since the most recent fire increases, shrubs increase.

Dominant plant species

- twoneedle pinyon (*Pinus edulis*), tree
- oneseed juniper (*Juniperus monosperma*), tree
- oak (*Quercus*), shrub
- mountain mahogany (*Cercocarpus*), shrub
- sideoats grama (*Bouteloua curtipendula*), grass
- muttongrass (*Poa fendleriana*), grass
- sedge (*Carex*), grass

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	560	673	785
Grass/Grasslike	112	280	392
Shrub/Vine	56	112	168
Forb	2	6	11
Total	730	1071	1356

Table 6. Soil surface cover

Tree basal cover	1-3%
Shrub/vine/liana basal cover	5-10%
Grass/grasslike basal cover	25-40%
Forb basal cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-30%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	25-35%
Bedrock	0%
Water	0%
Bare ground	20-30%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	0%	1-2%	0-5%	0-2%
>0.15 <= 0.3	0%	1-2%	2-10%	0-5%
>0.3 <= 0.6	1-5%	1-5%	2-5%	0-1%
>0.6 <= 1.4	1-5%	5-10%	0%	0%
>1.4 <= 4	5-10%	0-5%	0%	0%
>4 <= 12	15-25%	0%	0%	0%
>12 <= 24	0%	0%	0%	0%
>24 <= 37	0%	0%	0%	0%
>37	0%	0%	0%	0%

Figure 5. Plant community growth curve (percent production by month). NM0317, R035XG127NM-Savanna-HCPC. Large tree-type pinyon and/or juniper w/open grass stands in between..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	7	10	15	25	25	8	5	0	0

Community 1.2

Shrub Dominated Understory

This phase resembles 1.1, but with an understory dominated by shrubs.

Dominant plant species

- oneseed juniper (*Juniperus monosperma*), tree
- twoneedle pinyon (*Pinus edulis*), tree
- oak (*Quercus*), shrub
- mountain mahogany (*Cercocarpus*), shrub

Pathway P1.1A

Community 1.1 to 1.2

This community pathway was not described within the legacy ESD. However, it clearly involves an increase in shrub dominance at the expense of herbaceous cover. Continuous grazing and, perhaps, fire suppression, would be the likely mechanisms for this pathway. Continuous grazing can be described here as: Season-long grazing providing little rest and recovery for preferred grazed plants during critical growing periods, coupled with high utilization.

Pathway P1.2A

Community 1.2 to 1.1

This community pathway was not described within the legacy ESD. However, it clearly involves an increase in the dominance of herbaceous species and an attendant decrease in shrub cover. Likely mechanisms include shrub control (mechanical and/or chemical) fire events, and prescribed grazing.

State 2

State 2

The overstory of this state is dominated by twoneedle piñon.

Characteristics and indicators. Overstory dominated by twoneedle piñon.

Dominant plant species

- twoneedle pinyon (*Pinus edulis*), tree

Community 2.1

Little understory, thick overstory, PIED dominated

This phase contains a thick overstory of piñon pine, and a sparse understory.

Dominant plant species

- twoneedle pinyon (*Pinus edulis*), tree

State 3

State 3

This state resembles State 2, except that PIPO is a significant component of the overstory.

Dominant plant species

- ponderosa pine (*Pinus ponderosa*), tree

Community 3.1

Little understory, thick canopy, mixed PIPO

This phase contains a thick overstory which includes ponderosa pine. The understory is sparse.

Dominant plant species

- twoneedle pinyon (*Pinus edulis*), tree
- ponderosa pine (*Pinus ponderosa*), tree

Transition T1A

State 1 to 2

Increase in overstory, loss of understory production due to change in fire regime caused by fire suppression and overgrazing. Loss of understory increases fire suppression and erosion.

Transition T1B

State 1 to 3

Increase in overstory, loss of understory production due to change in fire regime caused by fire suppression and overgrazing. Loss of understory increases fire suppression and erosion. A few wet years in which PIPO are established.

Restoration pathway R2A

State 2 to 1

Restoration of herbaceous understory component through thinning of pinon, cutting of ponderosa, possibly seeding, and proper grazing management.

Transition T2A

State 2 to 3

Wet year and fire suppression.

Restoration pathway R3A

State 3 to 1

Restoration of understory component through thinning, possibly seeding, and proper grazing management.

Additional community tables

Animal community

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

Hydrological functions

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

Hydrologic Interpretations

Soil Series----- Hydrologic Group

Fangio----- B

Wood products

Forest products include firewood and fence posts. Merchantable timber does not come from this site.

Other information

Soils associated with this site include Fangio, Ortiz, Sabroso, and Verano.

Other references

Allen, C.D. 1998. Where have all the grasslands gone? Quivera Coalition Newsletter, Spring/Summer.

Contributors

Christine Bishop

Approval

Kendra Moseley, 9/12/2023

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

Indicators

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

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

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

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

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

6. **Extent of wind scoured, blowouts and/or depositional areas:**

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

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

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

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

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

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

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

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

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

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

17. **Perennial plant reproductive capability:**
