USDA Natural Resources
Conservation Service

Ecological site DX035X03A005
Woodland Uplands Transition 16-35

Accessed: 05/11/2025

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.

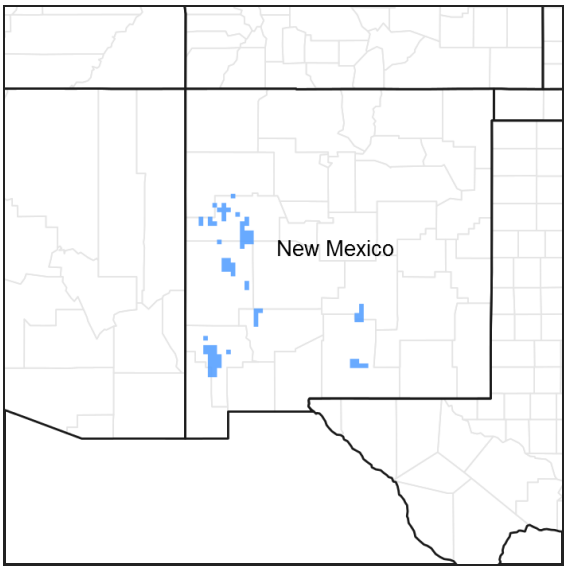


Figure 1. Mapped extent

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.

Classification relationships

An ecological site description (ESD) has not been prepared for the Valnor soil series. The Midnight soil series has an ESD completed, called Stony Loam. The Parquat-Tafoya association has a rangeland ESD completed, called Savannah.

The following existing ESDs were evaluated in the development of this ESD. Both overstory and understory characteristics were assessed and compared to the data collected for this ESD. The existing ESDs are: Stony Loam (R036XA018NM); Savannah (R036XB127NM); Hills (R036XB124NM); Gravelly (R036XB114NM); Juniper woodland (F036XB002NM); and Pinyon/Juniper woodland (F036XB001NM).

The Stony Loam ESD describes a grassland-shrub dominated plant community, whereas very few pinyon or oneseed junipers exist in the plant community. The site is of comparable elevation but the plant structure and species dominance does not coincide with the plant communities in this ESD. The Savannah ESD occurs at a lower elevation though it has both pinyon and juniper in the stands with occasional ponderosa pine at higher elevations. The juniper species is not clearly defined in that ESD, but it’s assumed to be dominated by oneseed juniper. The canopy cover is less than described in this ESD. The Hills ESD is also of lower elevation and tends to favor junipers as dominant over pinyon, with grasslands intermixed; again not comparable to this ESD. The Juniper and Pinyon-Juniper woodland ESDs are from the Zuni reservation, both reflecting drier site conditions and favoring pinyon and oneseed juniper which do not correspond to the vegetative structure and composition described in this ESD.

The understory vegetation, in all of the soils visited was dominated by blue grama. The historical climax plant

community structure (composition and density) is derived from data interpretation and not from adaptation of existing ESDs. The NRCS plant species list was consulted to determine the likelihood of a species occurring within these soil series.

Table 1. Dominant plant species

Tree	(1) *Pinus edulis* (2) *Juniperus deppeana*
Shrub	(1) *Cercocarpus montanus*
Herbaceous	Not specified

Legacy ID

F035XG005NM

Physiographic features

The site varies in topographic location. In some areas the site is typically located on plateaus and mesas with slope ranging from 1 to 25%. On another location the site is located on hills, alluvial fans, and alluvial terraces. Slope ranges from 5 to 30%. Overall, the terrain appears to be rolling hills and gentle sloping terrain from mesas or hills.

The Valnor soil series has a runoff class of medium to a very rapid class in the Midnight soil series. The water erosion hazard for the Valnor-Midnight association is moderate to very high. The Parquat soil series has a runoff class of medium to a rapid class in the Tafoya soil series, with an erosion hazard of moderate to high for the Parquat-Tafoya association.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Mesa
Flooding frequency	None
Elevation	7,600–8,200 ft
Slope	1–30%

Climatic features

The climate station used as a reference for this Ecological Site Description (ESD) is Pie Town 19 NE located in northeast Catron County, NM. Climate data for the Pie Town 19 NE station was obtained from the Western Regional Climate Center (http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?nmpiet). This station is considered to be at the low end of comparability to the sites in this ESD. The sites appear to have a slightly higher precipitation zone than the representative weather station due to the presence of montane tree species.

Pie Town 19 NE weather station is within climatic division NM-04, Southwestern Mountains. According to Catron County Soil Survey, the Valnor-Midnight association is within a 15-18 inch average annual precipitation zone (MLRA 35-NM1). The Parquat-Tafoya association is in MLRA 39, with a 12-15 inch precipitation zone.

The Pie Town 19 NE weather station has an annual average temperature variance from 36 degrees to 62 ºF. The Pie Town 19 NE weather station has recorded that 39% of the moisture falls in the winter (OCT–MAR) and 61% is received during the warmer periods (APR-SEP), for an annual average of 14.5 inches. The soil survey indicates that frost-free (=32.5 ºF) days range from 80-130 days. The weather station data (from Freeze-free probability table, at 90%, WRCC) indicates that the freeze-free (=28.5 ºF) days ranges from 176 to 199 days.

Table 3. Representative climatic features

Frost-free period (average)	130 days

Freeze-free period (average)	199 days
Precipitation total (average)	21 in

Influencing water features

There are no influencing water features except for runoff and retention of snow-pack on northerly aspects. This site is not influenced by wetlands or free-flowing streams or seeps.

Soil features

This ecological site is supported by the Valnor and Midnight soil series (map unit 486) and the Parquat and Tafoya soil series (map unit 705) as mapped in the Catron County, Northern Part, Soil Survey.

The representative soil series is Valnor, which is a fine, mixed, superactive Frigid Haplustalf. The Valnor series occurs in conjunction with the Midnight series which is a loamy-skeletal, mixed, non-acid, frigid, shallow Typic Ustorthent. They are typically located on plateaus and mesas.

The Parquat and Tafoya series are clayey-skeletal, mixed, mesic, Aridic Argiustolls. These soils are located on hills, alluvial fans, and alluvial terraces.

Valnor soils are fine sandy loams and the Midnight soils are very gravelly loams. Parquat soils are very cobbly sandy loams and the Tafoya soils are gravelly sandy loams. The Valnor-Midnight association is derived from sandstone and shale. The Parquat-Tafoya association is derived from volcanic alluvium. The Valnor and Midnight soils are shallow to moderately deep and well drained. The Parquat and Tafoya soils are deep and well drained. In general, these soils are located in areas that receive cooler temperatures and moisture from orographic winter storms which favors cold-tolerant tree species.

These soils are prone to wind and water erosion. As sheet erosion becomes common, the herbaceous plants will exhibit pedestalling in the tree interspaces.

Table 4. Representative soil features

Surface texture	(1) Very gravelly fine sandy loam (2) Gravelly loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to rapid
Soil depth	17–40 in
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0–40%
Available water capacity (0-40in)	0.13–0.16 in
Electrical conductivity (0-40in)	0–2 mmhos/cm
Subsurface fragment volume <=3" (Depth not specified)	0–40%
Subsurface fragment volume >3" (Depth not specified)	0–45%

Ecological dynamics

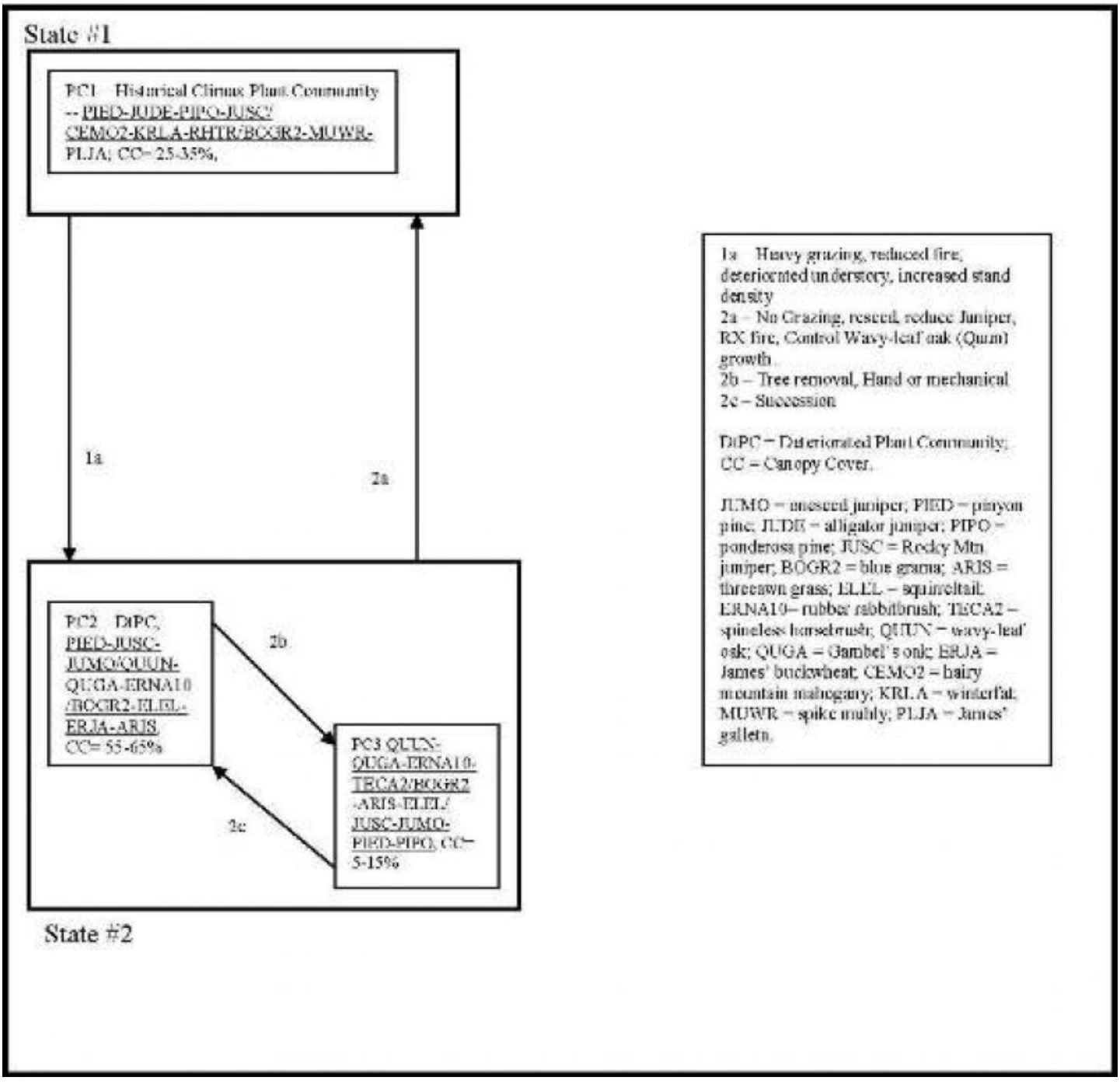
The ecological site is dominated by a woodland plant community with characteristic vegetation of the Colorado

Plateau pinyon-juniper woodland zone and the montane ponderosa pine forest zone. A mixture of tree species from both biotic zones can be found on this ecological site in varying densities. This site occupies an ecotone between the mesic and frigid temperature regimes which influences plant composition and density. Tree species dominance may be influenced by the frequency of fire, the tree's resilience to drought and disease, and climatic variations that affect soil moisture and temperature.

Transitions between the states are driven by livestock grazing and the presence or lack of fire (prescribed or natural) in the plant communities. Heavy livestock grazing deteriorates the understory vegetation and accelerates tree growth along with non-palatable shrub species. No livestock grazing, or conservative livestock grazing levels results in greater understory plant diversity and promotes opportunities for natural or prescribed fire occurrences.

As an observation of this ecological site, a different fire regime may have existed prior to the advent of livestock grazing. This is based on old fire-scarred alligator juniper trees co-existing with unscarred Rocky Mountain and oneseed junipers. The historical fire regime may have consisted of high frequency and low intensity fires that did not result in widespread tree mortality, but rather maintained a savannah-like stand structure.

State and transition model



State 1
Historical Climax Plant Community

Community 1.1
Historical Climax Plant Community

Overview: Plant communities occurring on the Valnor, Parquat, and Tafoya soil series were sampled to determine stand density, age structure, and tree species dominance (by frequency and canopy cover). This data is used to estimate HCPC plant composition and stand structure. The data is summarized and collectively used to estimate successional pathways. A total of 23 plots have been sampled (6 for Valnor; 17 for Parquat/Tafoya), with varying aspect and elevation. The Valnor, Midnight, Parquat, and Tafoya soil series support plant communities that are a transition between pinyon-juniper woodlands and ponderosa pine forest, whereas the woodland plant community still dominates the ecological site. State 2, Plant Community 2 is the only recorded plant community in this ESD, due to extensive vegetative changes that have occurred upon these soils. The other plant communities in this ESD are estimated. For the estimated plant communities, composition and production of plant species and other related numerical values are 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 compositions. State #1, Plant Community #1 - Historical Climax Plant Community (HCPC): This state reflects the pre-European settlement conditions. Natural fires are a component of this state and are estimated to occur with a relatively moderate frequency, possibly averaging 25 to 100 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 a fairly open stand of trees, but they may be incidental occurrences affecting small groups of trees. This is a woodland-dominated state with ponderosa pine and Rocky Mountain juniper existing in association with a pinyon-juniper plant community. Ponderosa pine is not expected to be quality sawtimber. The HCPC consists of old trees dominating the site comprising 75 to 85% of the stand. Mid-age trees comprises 10-15% or less, with young-age classes (seedlings/saplings) comprising 0-10% of the stand. The young-age class may not exist in some plant communities following low intensity fires. Generally, Rocky Mountain and oneseed junipers would be held in check by natural fires, resulting in tree mortality or severe fire pruning. Plant Community 1 (PC1) is estimated as the climax plant community, self-sustaining through periodic natural fires with minimal susceptibility to insect and disease. This plant community is dominated by pinyon with a co-dominant or subdominant alligator juniper. Subdominant trees would be ponderosa pine and Rocky Mountain juniper. In the HCPC, the trees per acre (t/a) are estimated to range from a low of 20-35 t/a in some sites to a high of 45-55 t/a in other sites. (Note: The HCPC projections are derived from reconstructed stand structure analysis using existing data.) In sandstone-derived soils the herbaceous component is a mixture of warm- and cool-season plants. The following species are expected to be encountered: spike muhly, pine dropseed, western wheatgrass, prairie junegrass, squirreltail, and blue grama. On basalt derived soils, these species may be found: New Mexico feathergrass, James' galleta, little bluestem, prairie junegrass, muttongrass, squirreltail, pine dropseed, common wolfstail, littleseed ricegrass, pine muhly, Arizona threeawn, and blue grama. Gray oak would be a minor component in the overstory along with hairy mountain mahogany and skunkbush sumac found in low quantities within the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	1100	1370	1640
Grass/Grasslike	165	194	222
Shrub/Vine	25	35	45
Forb	0	1	2
Total	**1290**	**1600**	**1909**

Table 6. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	4%
Grass/grasslike foliar cover	54%

Forb foliar cover	2%
Non-vascular plants	0-1%
Biological crusts	0%
Litter	18%
Surface fragments >0.25" and <=3"	2%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	18%

State 2
PC2 - Deteriorated Plant Community (DtPC)

Community 2.1
PC2 - Deteriorated Plant Community (DtPC)

This state has evolved from long-term heavy grazing and the reduction of fine fuels that has contributed to the disruption in the natural fire cycle. Progression toward HCPC from State #2 requires elimination of grazing, with extensive land treatments (thinning, reseeding, and burning) to restore the plant community structure and function. The site appears aridic due to the lack of ground cover which benefits the establishment of drought tolerant species, such as Rocky Mountain and oneseed junipers. Plant Community 2 (PC2) is prevalent in this state and appears to be self-sustaining, almost a static state. Pinyon is the dominant tree species with Rocky Mountain and oneseed junipers as subdominant. Alligator juniper and ponderosa pine occur on the site but only as remnants due to lack of fire necessary to suppress the growth of other junipers. Natural fires (ground or crown) are essentially non-existent. Incidental fires may occur as individual tree fires caused by lightning strikes or small area (patch-size) crown burns aided by ladder fuels and strong wind events. Gambel and wavy-leaf oak can be encountered on this site but as a minor component in the plant community. Rubber rabbitbrush and horsebrush are the most common shrubs. The age structure is comprised of about 14% very old trees, which are widely scattered throughout the site. The mid-aged and young age-class trees comprise about 71% of the site, with the remainder comprised of saplings taller than 4.5 feet but less than 3 inches in diameter at the root collar. In State #2, the trees per acre (t/a) can range from a low of 81-135 t/a in some sites to a high of 130-218 t/a in other sites. Canopy cover ranges from 55 to 65% overall, with canopy cover expected to be slightly lower in basalt-derived soils. The canopy cover is expected to be greater on north aspects than on south aspects. The herbaceous component is dominated by blue grama with minor occurrences of spike muhly, squirreltail, prairie junegrass, littleseed ricegrass, pine dropseed, and red threeawn. Ground cover and forage production values are both very low. Shrubs are dominated by rabbitbrush or horsebrush with substantial densities of snakeweed. Desirable shrubs, such as hairy mountain mahogany and skunkbush sumac, are heavily browsed and decadent from overuse.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	4939	6155	7370
Grass/Grasslike	18	64	109
Shrub/Vine	5	9	12
Forb	0	3	5
Total	**4962**	**6231**	**7496**

Table 8. Ground cover

Tree foliar cover	0-2%
Shrub/vine/liana foliar cover	0-1%

Grass/grasslike foliar cover	4%
Forb foliar cover	0-1%
Non-vascular plants	0-1%
Biological crusts	0%
Litter	31%
Surface fragments >0.25" and <=3"	2%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	58%

State 3
PC3 - Early Seral

Community 3.1
PC3 - Early Seral

Plant Community 3 (PC3) results from an overstory removal of the tree canopy, allowing shrubs, grasses, and younger-age class trees to dominate the ecological site. PC3 progresses to PC2 through succession, generally dominated by junipers and eventually shifting tree dominance to pinyon.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	317	639	960
Grass/Grasslike	300	340	380
Shrub/Vine	30	48	65
Forb	5	8	10
Total	**652**	**1035**	**1415**

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**warm-season increasers**			100–130	
	blue grama	BOGR2	*Bouteloua gracilis*	100–125	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	0–3	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–2	–
2	**warm-season decreasers**			0–2	
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	0–2	–
	common wolfstail	LYPH	*Lycurus phleoides*	0	–
	pine muhly	MUDU	*Muhlenbergia dubia*	0	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	0	–
	James' galleta	PLJA	*Pleuraphis jamesii*	0	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0	–

3	**warm-season decreaser (squirreltail)**			5–10	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	5–10	–
4	**cool-season decreasers**			40–50	
	prairie Junegrass	KOMA	*Koeleria macrantha*	15–20	–
	muttongrass	POFE	*Poa fendleriana*	10–12	–
	western wheatgrass	PASM	*Pascopyrum smithii*	5–6	–
5	**cool-season increasers**			20–30	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	10–20	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	10	–
Forb					
6	**warm-season forbs**			0–2	
	prairie Junegrass	KOMA	*Koeleria macrantha*	40–50	–
	western wheatgrass	PASM	*Pascopyrum smithii*	40–50	–
	muttongrass	POFE	*Poa fendleriana*	40–50	–
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	0–1	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	0–1	–
	globemallow	SPHAE	*Sphaeralcea*	0	–
Shrub/Vine					
7	**increaser half-shrubs**			0–6	
	little bluestem	SCSC	*Schizachyrium scoparium*	15–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–5	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–1	–
8	**cool-season shrubs**			25–35	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	20–30	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	20–30	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	10–15	–
	gray oak	QUGR3	*Quercus grisea*	5–10	–
	skunkbush sumac	RHTR	*Rhus trilobata*	10	–
9	**succulent shrubs**			0–1	
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	0–2	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	0–2	–
	globemallow	SPHAE	*Sphaeralcea*	0–2	–
	yucca	YUCCA	*Yucca*	0–1	–
	pricklypear	OPUNT	*Opuntia*	0	–
10	**increaser shrubs**			0–3	
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	0–2	–
	currant	RIBES	*Ribes*	0–1	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	0	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0	–
	desert-thorn	LYCIU	*Lycium*	0	–
Tree					

11	**coniferous trees**			100–263	
	twoneedle pinyon	PIED	*Pinus edulis*	677–1010	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	322–480	–
	alligator juniper	JUDE2	*Juniperus deppeana*	54–80	–
	ponderosa pine	PIPO	*Pinus ponderosa*	34–50	–
	oneseed juniper	JUMO	*Juniperus monosperma*	13–20	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–5	–

Table 11. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**warm-season increasers**			18–102	
	blue grama	BOGR2	*Bouteloua gracilis*	18–99	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	0–2	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–1	–
2	**warm-season decreasers**			0–2	
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	0–2	–
	common wolfstail	LYPH	*Lycurus phleoides*	0	–
	pine muhly	MUDU	*Muhlenbergia dubia*	0	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	0	–
	James' galleta	PLJA	*Pleuraphis jamesii*	0	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	0	–
3	**cool-season increaser (squirreltail)**			0–4	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0–4	–
4	**cool-season decreasers**			0–1	
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–1	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0	–
	muttongrass	POFE	*Poa fendleriana*	0	–
5	**cool-season increasers**			0	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	0	–
Forb					
6	**warm-season forbs**			0–5	
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	0–2	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	0–2	–
	globemallow	SPHAE	*Sphaeralcea*	0–1	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–1	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–1	–
	muttongrass	POFE	*Poa fendleriana*	0–1	–
Shrub/Vine					
7	**increaser half-shrubs**			1–2	

	prairie sagewort	ARFR4	*Artemisia frigida*	1	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–1	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0	–
8	**cool-season shrubs**			0–1	
	gray oak	QUGR3	*Quercus grisea*	0–1	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	0	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	0	–
9	**succulent shrubs**			0–2	
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	0–5	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	0–5	–
	globemallow	SPHAE	*Sphaeralcea*	0–5	–
	yucca	YUCCA	*Yucca*	0–2	–
	pricklypear	OPUNT	*Opuntia*	0	–
10	**increaser shrubs**			4–7	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	1–2	–
	desert-thorn	LYCIU	*Lycium*	1–2	–
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	1–2	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	1	–
	currant	RIBES	*Ribes*	0	–
Tree					
11	**coniferous trees**			3285–6570	
	twoneedle pinyon	PIED	*Pinus edulis*	3886–5800	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	603–900	–
	oneseed juniper	JUMO	*Juniperus monosperma*	389–580	–
	alligator juniper	JUDE2	*Juniperus deppeana*	54–80	–
	ponderosa pine	PIPO	*Pinus ponderosa*	7–10	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–1	–

Table 12. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**warm-season increasers**			130–160	
	blue grama	BOGR2	*Bouteloua gracilis*	125–150	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	3–7	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	2–3	–
2	**warm-season decreasers**			80–100	
	spike muhly	MUWR	*Muhlenbergia wrightii*	25–30	–
	little bluestem	SCSC	*Schizachyrium scoparium*	25–30	–
	pine muhly	MUDU	*Muhlenbergia dubia*	15–20	–

	common wolfstail	LYPH	*Lycurus phleoides*	8–12	–
	James' galleta	PLJA	*Pleuraphis jamesii*	6–7	–
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	1	–
3	**cool-season increaser (squirreltail)**			15–20	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	15–20	–
4	**cool-season decreasers**			40–55	
	prairie Junegrass	KOMA	*Koeleria macrantha*	15–20	–
	western wheatgrass	PASM	*Pascopyrum smithii*	10–15	–
	muttongrass	POFE	*Poa fendleriana*	10–15	–
5	**cool-season increasers**			35–45	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	20–25	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	15–20	–
Forb					
6	**warm-season forbs**			5–10	
	prairie Junegrass	KOMA	*Koeleria macrantha*	40–60	–
	western wheatgrass	PASM	*Pascopyrum smithii*	40–60	–
	muttongrass	POFE	*Poa fendleriana*	40–60	–
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	2–4	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	2–4	–
	globemallow	SPHAE	*Sphaeralcea*	1–2	–
Shrub/Vine					
7	**increaser half-shrubs**			5–11	
	little bluestem	SCSC	*Schizachyrium scoparium*	25–30	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	5–10	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–1	–
8	**cool-season shrubs**			25–50	
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	35–45	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	35–45	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	10–20	–
	skunkbush sumac	RHTR	*Rhus trilobata*	10–20	–
	gray oak	QUGR3	*Quercus grisea*	5–10	–
9	**succulent shrubs**			0–2	
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	5–10	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	5–10	–
	globemallow	SPHAE	*Sphaeralcea*	5–10	–
	pricklypear	OPUNT	*Opuntia*	0–1	–
	yucca	YUCCA	*Yucca*	0–1	–
10	**increaser shrubs**			0–2	
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	0–1	–
	currant	RIBES	*Ribes*	0–1	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	0	–

	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0	–
	desert-thorn	LYCIU	*Lycium*	0	–
Tree					
11	**coniferous trees**			317–960	
	twoneedle pinyon	PIED	*Pinus edulis*	195–590	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	92–280	–
	alligator juniper	JUDE2	*Juniperus deppeana*	17–50	–
	ponderosa pine	PIPO	*Pinus ponderosa*	10–30	–
	oneseed juniper	JUMO	*Juniperus monosperma*	3–10	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	5–10	–

Animal community

These areas are grazed by livestock. Slopes are gentle enough to allow livestock unlimited access over most of the terrain. There are no naturally occurring water sources (springs or streams) in any of the ecological sites. Livestock use depends on the development of man-made watering facilities (wells or stock tanks) and herding techniques to distribute livestock. Livestock have been in various parts of these soils for over a century and their effect on the land and vegetation is evident.

Stocking capacity in State #2 is low due to low forage production. The primary forage species in State #2 is blue grama grass. A transition from State #2 to State #1 requires elimination of grazing, reseeding herbaceous plants, and reducing tree density to achieve historical fire regime.

Competition for forage between livestock and wildlife can occur within these sites, especially in regard to cool-season grasses and desirable shrubs. Desirable shrub species are severely hedged and exist in decadent form in State #2.

Hydrological functions

The course fragments (gravel, cobble, and stone) comprise a minor part of the ground cover that protects and binds the soil. The soil does contain fine sandy loam to very gravelly or cobbly loam which is subjected to sheet erosion in State #2, due to insufficient ground cover (vegetation and litter). In State #2, the ground cover is minimal consequently much of the moisture is lost in run-off. In State #1 the plant community has a greater diversity and density of herbaceous plants, which reduces run-off and increases infiltration.

Recreational uses

This site is conducive to recreational opportunities such as camping, pinyon nut and firewood gathering. The woodland plant community also provides thermal and nesting cover for wildlife and may provide hunting opportunities at certain times of the year. Vehicle use occurs on these sites and the terrain is conducive to off-road use with soil degradation consequences. Scenic values are not high, and changing the vegetative patterns across the site will not change the scenic rating significantly except that it may induce more wildlife activity and viewing opportunities.

Wood products

Many of the sites produce a substantial amount of wood fiber due in part to large diameter trees and the occurrence of ponderosa pine in the stands. States #1 and #2 produce different levels of wood fiber volume. The amount of merchantable timber is negligible.

Fuelwood volume is estimated to be about 0.5 cord of wood per acre per year on a sustainable basis, assuming a 150 year rotation cycle, harvesting only the old-age class trees in the stand in the historical climax plant community. Wood posts and stays could also be derived from the woodland plant communities but the volume and quality may vary significantly between each of the soil series due to varying height, density, and age classes of trees across the

landscape.

Site index rating class (based on Howell's Site Index Curves, 1940) for Valnor soil series is rated at 2 (50 to 100 basal area). The Parquat and Tafoya soil series site index is rated at 3 (0 to 50 basal area).

Other products

None

Other information

Historical and current grazing practices have significantly altered the plant composition on these soils. Restoration efforts will entail a long-term recovery process to restore the native plant diversity and stand structure to replicate State #1. Reseeding will be an integral part of the recovery process.

Other references

Baker, W.L. and D.J. Shinneman. 2004. Fire and restoration of piñon–juniper woodlands in the western United States: a review, Forest Ecology and Management 189(1-3):1–21.

Barger, R.L. and P.F. Folliott. (1972) Physical characteristics and utilization of major woodland tree species in Arizona. USDA Forest Service Research Paper RM-83, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Brown, J.K. and J.K. Smith. 2000. Wildland fire in ecosystems: effects of fire on flora Gen. Tech. Rep. RMRS-GTR-42-vol. 2. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 257 p.

Dick-Peddie, W.A. 1993. New Mexico vegetation: Past, present, and future. University of New Mexico Press, Albuquerque. 244 pp.

Howell, J., Jr. 1940. Pinyon and juniper – A preliminary study of volume, growth, and yield, USDA Soil Conservation Service, Region 8, Bulletin 71, Albuquerque, NM.

McPherson, G.R. and J.F. Weltzin. 2000. Disturbance and climate change in United States/Mexico borderland plant communities: a state-of-the-knowledge review. Gen. Tech. Rep. RMRS-GTR-50. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 24 p.

Swetnam, T.W. and P.M. Brown. 1992. Oldest known conifers in the southwestern United States: temporal and spatial patterns of maximum age. P. 24-38 In: Kaufmann, M.R., W.H. Moir, and R.L. Bassett (eds) Old-growth forests in the southwest and Rocky Mountain regions. United States Department of Agriculture Forest Service, General Technical Report RM-213.

USDA Forest Service. 2000. Vegetative Structural Stages, Southwestern Region, RMSTAND data. March (updated January 3, 2003).

USDA, NRCS. 2008. The PLANTS Database (http://plants.usda.gov, 24 July 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA-NRCS. 1997. Inventorying, Classifying, and Correlating Juniper and Pinyon Communities to Soils in Western United States. September. Grazing Lands Technology Institute. Ft. Worth, Texas. 39 p.

USDA-NRCS. 1985. Soil Survey of Catron County, New Mexico, Northern Part. 199 p.

USDI-BLM. 2005. Fire Regime Condition Class (FRGG) Interagency Handbook Reference Condition. April 6. Draft document. Modeler: Doug Havlina.

Contributors

Michael Carpinelli
Noe Gonzalez

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:**

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:**