USDA Natural Resources
Conservation Service

Ecological site DX035X03A004
Hills or Elevated Plains 12 to 15 inches

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.

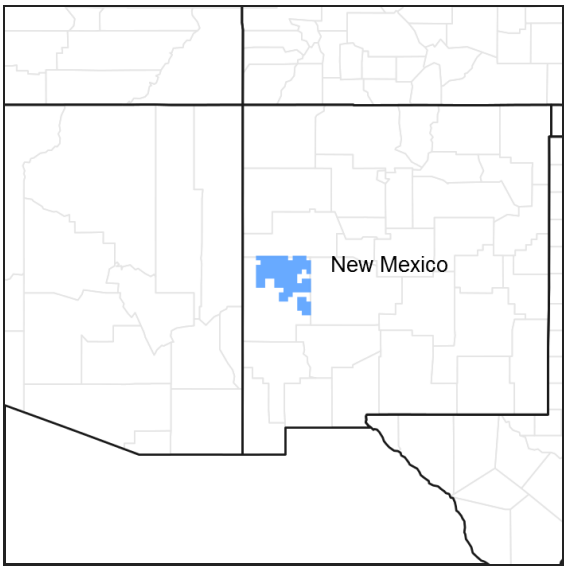

Figure 1. Mapped extent

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

The understory vegetation was compared to existing ESDs:
Savannah (R036XB127NM)
Hills (R036XB124NM)
Sandstone Hills (R036XB122NM)
Gravelly (R036XB114NM)

The overstory plant community was compared to information developed for the Zuni Reservation:
Juniper woodland (F036XB002NM)
Pinyon/Juniper woodland (F036XB001NM)

The understory vegetation, in almost all of the mapping units visited, was dominated by blue grama. The above ESDs were used to estimate potential plant community structure for this ESD in the HCPC as well as the other states. The Savannah and Hills ESDs appeared to be most comparable to the plant communities encountered. Remnant species were found in some of the plant communities suggesting that their existence in the plant community may have been altered over time. Both forest ESDs provided suggestions in stand structure and succession.

Table 1. Dominant plant species

Tree	(1) *Pinus edulis* (2) *Juniperus monosperma*
Shrub	(1) *Atriplex canescens* (2) *Krascheninnikovia lanata*
Herbaceous	(1) *Bouteloua gracilis* (2) *Bouteloua curtipendula*

Legacy ID

F035XG004NM

Physiographic features

The representative map unit is on hills and alluvial fans, as well as on higher lying sideslopes on hills. Slope ranges from 2 to 15%. The unit is characterized by fine sandy loam, sandy loam, or loamy soil textures and are generally deep and well drained, although the soil can be shallow in some areas. The alluvium is generally derived from sandstone. Overall, the terrain appears to be gentle rolling hills, with or without distinctive drainage patterns. Aspect can vary, as well as influence diversity and density of vegetation. Areas can be irregular in shape. These map units vary in elevation which also influences species composition and site potential. It does vary from wetter and colder positions on the landscape to drier and lower landscapes, characterized by different species densities and dominance.

The associated mapping units are similar to Map Unit (MU) 340 in several respects but there exists minor differences in elevation, landform, and possibly differences in microclimate (precipitation and temperature regimes). The associated soils depict the range of variability of the pinyon-juniper plant communities in this region. These other soils are likely to react in similar fashion as MU 340 to biological, climatic, and human influences with slight variations due to individual soil characteristics, relative precipitation zones, or their position on the landscape. These differences may be expressed in variations of species composition, (overstory or understory) and tree density.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Saddle
Flooding duration	Brief (2 to 7 days) to very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding duration	Brief (2 to 7 days) to very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	6,700–7,800 ft
Slope	2–15%
Aspect	Aspect is not a significant factor

Climatic features

The representative weather station is located near Quemado, NM, Catron County, within 40 miles to sites sampled. The weather station is within the climatic division NM-04, Southwestern Mountains. According to Catron County Soil Survey, this map unit is within a precipitation zone of 12-15 inch average annual precipitation. Average annual air temperature is 47 to 54 degrees (F). Due to elevation and latitude, this landscape is prone to winter and summer moisture with summer moisture exceeding winter. Summer precipitation is typically derived from convective showers with snow- and rain-mixed winter storms. Frost-free days are based on >=32.5 degrees (F); freeze-free days based on >= 30 degrees (F).

Table 3. Representative climatic features

Frost-free period (average)	130 days
Freeze-free period (average)	214 days
Precipitation total (average)	15 in

Influencing water features

None, except downslope runoff and slope retention of snow-pack on North slopes.
This unit is not influenced by wetlands or free-flowing streams or seeps.

Soil features

The site is supported by the Flugle series and typic ustorthents on hills and alluvial fans in map unit 340 of the Catron County, Northern Part, Soil Survey. Other soils supporting this site are the Loarc, Datil, Majada, Lapdun, Ralphston, Amenson, Manzano, Celsosprings, Dioxice, Motoqua, Faraway, Guy, Celacy, Joachem, Abrazo, Apache, Diatee, Hiarc, Telescope, Mion, Travessilla, and Royosa series.

In map unit 340, the Flugle soil component comprises 40% of the map unit with 2 to 15% slopes and contains a fine sandy loam texture. The typic ustorthents comprise 35% of the unit with 5 to 15% slopes derived from sandstone.

The Flugle soil is deep and well drained and formed in alluvium. The typic Ustorthents are shallow to deep and well-drained and derived mostly from sandstone. This map unit has variable slope and aspect characteristics and varies elevationally with comparable differences in temperature and precipitation regimes. Some sites are dominated by pinyon pine with codominant oneseed juniper, while other sites contain ponderosa pine and alligator juniper co-occurring with the pinyon/juniper, indicative of variable climatic conditions. Lower-elevation sites are prone to being drier and dominated by oneseed juniper.

This site also occurs in map units 335, 580, and 655; ranging in slope from 1 to 20%, with soil textures of fine sandy loam to gravelly or cobbly loam; on hills, alluvial fans, slopes and ridges.

Table 4. Representative soil features

Surface texture	(1) Gravelly fine sandy loam (2) Cobbly loam (3) Sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to moderately well drained
Permeability class	Moderate to rapid
Soil depth	20–60 in
Surface fragment cover <=3"	0–35%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	11–13 in
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

Many of the soil map units (MU), including the reference site (MU 340), are complex soils comprised of a mixture of soil types. MU 340 has not been classified into an Ecological Site Description (ESD), as well as map units 366, 492, 497. Portions of the remaining mapping units have been classified in an ESD as hills, savannah, gravelly, swale, basalt hills, stony loam, shallow sandstone, or deep sand. The remaining range sites have varying densities of

pinyon and juniper present. In many instances the trees found upon those sites are in moderate to high density and many exhibit a very old age class, indicating that trees were a prominent feature upon the landscape. This ESD does not address swale, lowlands, or any other range site classed as a grassland-dominated plant community, though woodland species may be found upon such sites in very low densities, that is, extremely widely scattered trees with a spacing of 100+ feet.

The existing condition on many of these mapping units is characterized as follows: moderate to high tree densities exist; pinyon pine dominates most stands by frequency and canopy cover; map units are comprised of an uneven-aged stand of trees; pinyon pine seedlings/saplings surpass those of juniper; herbaceous cover exhibits minimal plant diversity; many of the sites contain dwarf mistletoe infestations and varying levels of pinyon pine mortality; all sites were found on hills, slopes, elevated plains, or ridges; and fire scars were typically found only on old oneseed juniper trees.

Map units 340, 335, 580, and 655 were sampled to collect data on tree density, canopy cover, basal area, composition, and age structure. Overall, pinyon pine dominated the stands, at 54% of composition by frequency and an average of 58% based on canopy cover. The age structure is dominated by oneseed juniper in the old tree age class on most sites with pinyon dominating the mid-aged class, indicating a transition to pinyon-dominated stands. It appears that pinyon may be shorter lived than juniper due to greater susceptibility to adverse conditions (climate, disease infestations, soil productivity). Juniper on the other hand is long-lived and appears to be the mainstay in many of these woodland/savannah plant communities.

There is variation in plant community structure when addressing the woodland characteristics of all the map units associated with this ESD. This ESD addresses those map units with less than 25% slope to nearly level, rolling terrain (slopes, hills, elevated plains, ridges), and generally with soils derived from alluvium or colluvium. Exposed bedrock or rock outcrops would be small inclusions or anomalies which are not directly associated with this ESD. Overstory vegetation could vary from the minor inclusions of ponderosa pine and alligator juniper at the upper range of this ESD (ie: MU 340, 341) to oneseed-dominated plant communities (ie: MU 650) at the lower end of this ESD. These differences are primarily driven by topography, elevation, aspect, or moisture variations, or a combination of all factors. It’s possible that an ESD could be developed for more site-specific detail, although in general terms, given the overall elevation, temperature, and precipitation range, the plant communities upon these soils would likely react in the same manner to biotic or abiotic influences resulting in relatively similar plant composition and successional pathways.

There are 3 states and up to 4 plant communities within those states. The states are described as follows: Historical Climax Plant Community (HCPC), State #1; Existing plant community (State #2) which is representative of the potential natural community (PNC) with some level of grazing and having variations in pinyon or juniper density; and an Early Seral State, State#3, which is a grassland-dominated state.

Grazing is not considered a part of the HCPC but other natural processes such as fire, drought, disease, and wildlife impacts are. These same influences also occur in State 2, with mechanical treatment as the primary source of change in State 3. A catastrophic fire may occur in States 1 and 2 as a wind-driven anomaly resulting in total reduction of the canopy cover, subsequently transitioning to State #3, a grassland landscape.

Overall, the common disturbances that affect the pinyon/juniper (P/J) in these map units are drought, disease, fire, excessive moisture, land treatment practices, and livestock grazing. Fire and drought would be common occurrences in the historical plant community and would regulate tree density and recruitment as well as herbaceous/shrub plant composition and distribution. The other disturbances would be more prevalent in the PNC and early seral states of the P/J communities. Overgrazing would contribute to the reduction or elimination of natural fire cycles by removing fine fuels. A broken fire cycle allows for high moisture periods to benefit P/J seedling establishment and survival and eventually an increase tree density. Drought, disease, and land treatment practices are disturbances that aid in resetting the plant community, substituting for natural fire occurrences to a limited extent.

Understory vegetation in the historical plant community and well managed plant communities generally would have a greater mix of cool- and warm-season herbaceous vegetation as well as a greater diversity in shrub species. In the heavily grazed plant communities, high tree density exists with almost a monoculture of blue grama along with invasive plants or annuals. Very few shrubs species are present, usually in decadent forms. Site indices (based on tree diameter in relation to basal area) for these sites are typically rated at a “2”, although drier sites rate at a “3”.

The Historic Plant Community would consist of old growth trees dominating the site comprising 70 to 80% of the stand, mid-age trees would comprise 20-25%, and young age classes (seedlings/saplings) comprise 0-10% of the stand. The young age class could be virtually nonexistent in some isolated areas due to recurring low-intensity natural fires. Mature trees would be long-lived, large diameter, with few, if any, dead trees present.

State and transition model

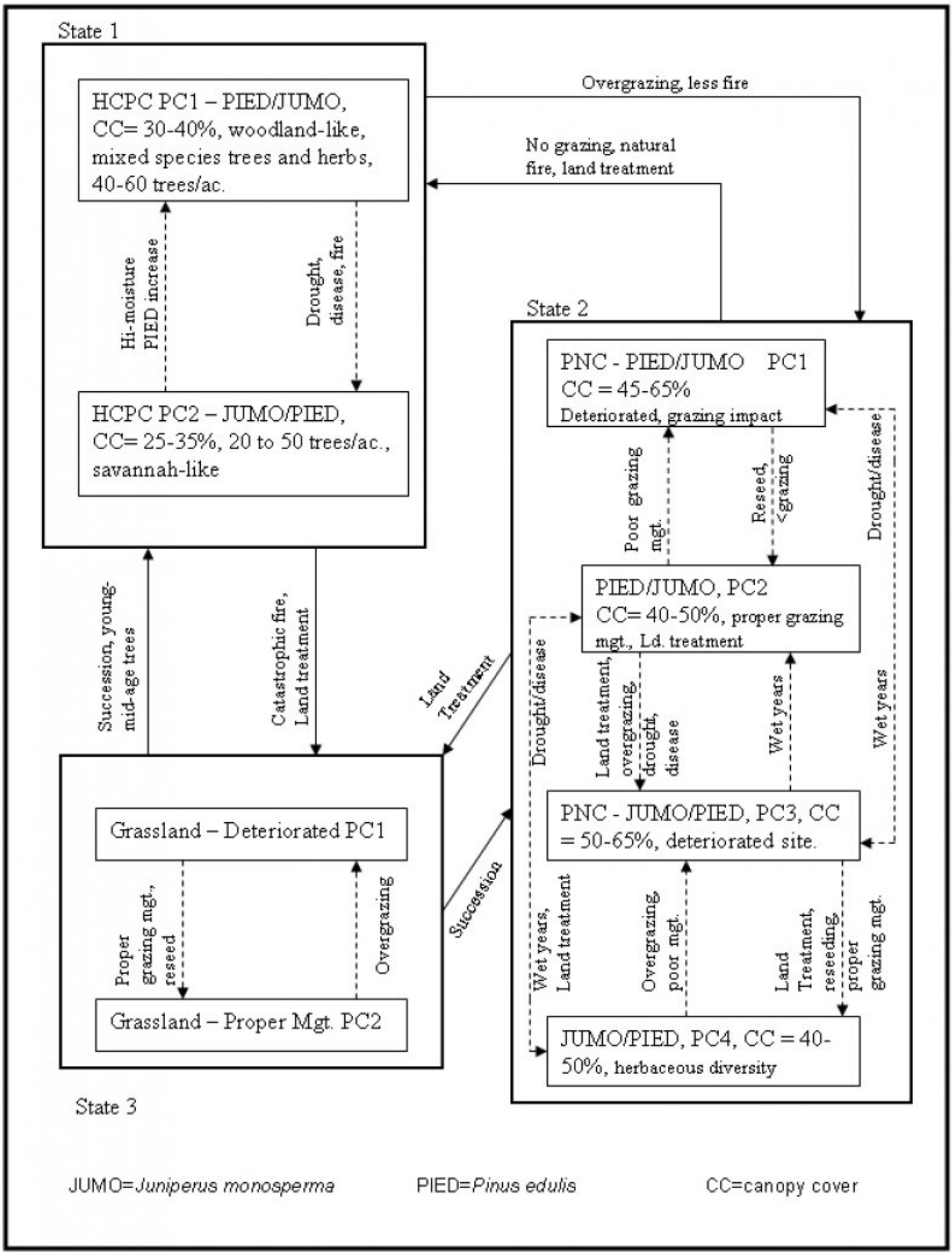

Figure 4. State-and-Transition Model

State 1

Historic Climax Plant Community (State 1, Plant Community 1)

Community 1.1
Historic Climax Plant Community (State 1, Plant Community 1)

State #1, Historical Climax Plant Community (HCPC): This state reflects a plant community structure not influenced by grazing or other human activity. Natural processes would occur such as, drought and disease mortality, natural fire events (both low and high intensity), and natural regeneration from favorable moisture periods. Plant Community #1 would be dominated by pinyon pine with codominant oneseed juniper. Canopy cover is about 30 to 40%; landscape portrays a woodland appearance with a mixture of tree species, including occurrences of Rocky Mountain juniper or alligator juniper with incidental occurrences of ponderosa pine. A diverse mixture of herbaceous understory would also persist, comprised of both cool- and warm-season species bunchgrasses and forbs. Some shrubs may also be present such as mountain mahogany, fourwing saltbush, skunkbush, and winterfat. Tree density may range from 40 to 60 trees per acre. Typically, an older age class would dominate the stands with large diameter trees common. Natural fire would tend to suppress regeneration to very few survival trees. A variation may occur in a lower elevation and precipitation range (warmer /drier sites) for this ESD, whereas pinyon pine and oneseed juniper may be the only trees species present; and ponderosa pine, alligator and Rocky Mountain junipers may not occur at all. Plant Community #2 is dominated by oneseed juniper with codominant or subdominant pinyon pine (<33% in composition) as in Map unit #650. This plant community would have more of a savannah-like appearance, with trees widely scattered and more open canopy (about 25 to 35% cover). Tree densities may range between 20 to 50 trees per acre. This plant community would result from drought, disease, or natural fire in PC#1, reducing the amount of pinyon pine. This plant community could revert to PC#1 through succession and brought about by high moisture periods and increases in pinyon pine density.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	1510	3775	6040
Grass/Grasslike	297	396	495
Shrub/Vine	31	43	55
Forb	5	10	15
Total	**1843**	**4224**	**6605**

State 2
Potential Natural Community (PNC) State 2, Plant Community 1

Community 2.1
Potential Natural Community (PNC) State 2, Plant Community 1

State #2, Potential Natural Community (PNC): State 1 would transition to State 2 as a result of overgrazing and reduction in fire. This in turn would result in an overall increase in tree density and canopy cover and may have a variable effect on understory species composition. Plant Community #1 would be the PNC with heavy grazing impact and poor range management practices, similar to existing conditions. The site would be considered deteriorated and would have a high density of pinyon pine. Oneseed juniper would be subdominant in terms of frequency and canopy cover. Canopy cover would range from 45 to 65%. Blue grama would be the dominant grass species, although forage production could be very low, 100 to 200 lb/ac. Plant Community #2 could result from PC1 by implementing improved grazing management (extended rest, deferment, reduced stocking rates), reduction in grazing intensity (less than 35% actual use on forage plants), land treatments (reduction in trees, mechanical, herbicide, fuelwooding and reseeding). Pinyon pine could still dominate but oneseed juniper may become codominant comprising 35 to 45% of the tree composition. Canopy cover could range from 40 to 50%. Herbaceous cover could be diverse, as in HCPC, but at reduced amounts and distribution. Plant Community #3 would result from PC1 or PC2 due to effects of drought, disease (reducing pinyon density), and overgrazing. The site would remain deteriorated with blue grama dominating the understory but at a lower production level (50 to 150 lb/ac). Oneseed juniper would dominate and pinyon pine would be subdominant (<33% in composition). Canopy cover would increase to 50 to 65% or more. Plant Community #4 could also result from PC2 due to drought and disease or from PC3 as a result of improved grazing management and land treatment practices.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	5514	10012	14510
Grass/Grasslike	212	254	296
Shrub/Vine	3	34	65
Forb	6	11	15
Total	**5735**	**10311**	**14886**

State 3
Early Seral (State 3, Plant Community 2)

Community 3.1
Early Seral (State 3, Plant Community 2)

State #3, Early seral state: State #3 could result from State 1 or 2 due to a catastrophic fire or land treatments that remove virtually all of the tree canopy cover. Two possible plant communities could exist. Plant Community #1 would be a deteriorated site resulting from heavy livestock grazing and likely dominated by blue grama, along with rabbitbrush or horsebrush. Some secondary herbaceous plants may also be present such as red threeawn, sand dropseed, squirreltail, globemallow, fringed sagewort, and buckwheat. Fourwing saltbush, wolfberry, and skunkbush may be found as well. Plant Community #2 would result from improved grazing management practices (extended rest and deferment, reduced stocking levels, lighter grazing intensity, and reseeding). This plant community would exhibit a mixture of native cool- and warm-season species such as western wheatgrass, junegrass, spike muhly, Stipa spp., Indian ricegrass, galleta, sideoats grama, bluestems, and muttongrass, as well as fourwing saltbush, winterfat, and mountain mahogany.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Tree	757	1526	2295
Grass/Grasslike	329	465	600
Shrub/Vine	85	115	145
Forb	15	20	25
Total	**1186**	**2126**	**3065**

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**warm-season increasers**			251–410	
	blue grama	BOGR2	*Bouteloua gracilis*	250–400	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	0–3	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–3	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	1–2	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–1	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	0–1	–
2	**warm-season decreasers**			7–29	
	spike muhly	MUWR	*Muhlenbergia wrightii*	1–10	

	spike muhly	MUWR	*Muhlenbergia wrightii*	1–10	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–5	–
	James' galleta	PLJA	*Pleuraphis jamesii*	2–4	–
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	3–4	–
	common wolfstail	LYPH	*Lycurus phleoides*	0–2	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–2	–
	little bluestem	SCSC	*Schizachyrium scoparium*	1–2	–
3	**cool-season increasers**			25–35	
	squirreltail	ELEL5	*Elymus elymoides*	10–15	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	7–10	–
	needle and thread	HECO26	*Hesperostipa comata*	3–5	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	5	–
4	**cool-season decreasers**			14–21	
	prairie Junegrass	KOMA	*Koeleria macrantha*	5–7	–
	western wheatgrass	PASM	*Pascopyrum smithii*	2–4	–
	muttongrass	POFE	*Poa fendleriana*	2–3	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	2	–
Forb					
5	**warm-season forbs**			5–15	
	James' buckwheat	ERJA	*Eriogonum jamesii*	3–6	–
	globemallow	SPHAE	*Sphaeralcea*	2–4	–
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	0–3	–
	four o'clock	MIRAB	*Mirabilis*	0–2	–
Shrub/Vine					
6	**half-shrub increasers**			2–12	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–10	–
	prairie sagewort	ARFR4	*Artemisia frigida*	1–2	–
7	**cool-season decreasers**			15–25	
	skunkbush sumac	RHTR	*Rhus trilobata*	10–15	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	5–10	–
8	**warm-season decreasers**			10	
	fourwing saltbush	ATCA2	*Atriplex canescens*	5	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	5	–
9	**succulents**			2	
	pricklypear	OPUNT	*Opuntia*	1	–
	yucca	YUCCA	*Yucca*	1	–
10	**warm-season increasers**			2–6	
	currant	RIBES	*Ribes*	1–3	–
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	1–2	–
	desert-thorn	LYCIU	*Lycium*	0–1	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	0	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0	–

Tree					
11	**conifers**			1510–6040	
	twoneedle pinyon	PIED	*Pinus edulis*	900–3600	–
	oneseed juniper	JUMO	*Juniperus monosperma*	610–2440	–

Table 9. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**warm-season increasers**			202–255	
	blue grama	BOGR2	*Bouteloua gracilis*	200–240	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	1–5	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	1–3	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	0–3	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–2	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–2	–
2	**warm-season decreasers**			7–16	
	James' galleta	PLJA	*Pleuraphis jamesii*	5–6	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	1–3	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–2	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–2	–
	pine dropseed	BLTR	*Blepharoneuron tricholepis*	0–1	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–1	–
	common wolfstail	LYPH	*Lycurus phleoides*	0	–
3	**cool-season increasers**			2–20	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	1–10	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	1–4	–
	needle and thread	HECO26	*Hesperostipa comata*	0–3	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	0–3	–
4	**cool-season decreasers**			1–5	
	prairie Junegrass	KOMA	*Koeleria macrantha*	1–2	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–1	–
	muttongrass	POFE	*Poa fendleriana*	0–1	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	0	–
Forb					
5	**warm-season forbs**			5–15	
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	20–25	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	15–20	–
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	4–8	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	1–3	–
	four o'clock	MIRAB	*Mirabilis*	1–2	–
	globemallow	SPHAE	*Sphaeralcea*	0–2	–

Shrub/Vine					
6	**half-shrub increasers**			1–23	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–20	–
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	2–4	–
	James' buckwheat	ERJA	*Eriogonum jamesii*	2–4	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–3	–
	globemallow	SPHAE	*Sphaeralcea*	1–2	–
7	**cool-season decreasers**			1–15	
	skunkbush sumac	RHTR	*Rhus trilobata*	1–10	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	0–5	–
8	**warm-season decreasers**			0–10	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–5	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–5	–
9	**succulents**			1–6	
	pricklypear	OPUNT	*Opuntia*	0–3	–
	yucca	YUCCA	*Yucca*	1–3	–
10	**warm-season increasers**			0–11	
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	0–3	–
	currant	RIBES	*Ribes*	0–3	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–2	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–2	–
	desert-thorn	LYCIU	*Lycium*	0–1	–
Tree					
11	**conifers**			5514–14510	
	twoneedle pinyon	PIED	*Pinus edulis*	3264–8590	–
	oneseed juniper	JUMO	*Juniperus monosperma*	2250–5920	–

Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**warm-season increasers**			315–530	
	blue grama	BOGR2	*Bouteloua gracilis*	300–500	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	4–10	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	3–7	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	3–5	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	3–5	–
	Arizona threeawn	ARAR6	*Aristida arizonica*	2–3	–
2	**warm-season decreasers**			10–28	
	spike muhly	MUWR	*Muhlenbergia wrightii*	1–7	–
	James' galleta	PLJA	*Pleuraphis jamesii*	5–6	–
	little bluestem	SCSC	*Schizachyrium scoparium*	3–5	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–3	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–3	–

	pine dropseed	BLTR	*Blepharoneuron tricholepis*	0–2	–
	common wolfstail	LYPH	*Lycurus phleoides*	0–2	–
3	**cool-season increasers**			2–35	
	squirreltail	ELEL5	*Elymus elymoides*	1–20	–
	New Mexico feathergrass	HENE5	*Hesperostipa neomexicana*	1–8	–
	needle and thread	HECO26	*Hesperostipa comata*	0–6	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–1	–
4	**cool-season decreasers**			2–7	
	western wheatgrass	PASM	*Pascopyrum smithii*	2–4	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–3	–
	pinyon ricegrass	PIFI	*Piptochaetium fimbriatum*	0	–
	muttongrass	POFE	*Poa fendleriana*	0	–
Forb					
5	**warm-season forbs**			15–25	
	James' buckwheat	ERJA	*Eriogonum jamesii*	5–10	–
	Carruth's sagewort	ARCA14	*Artemisia carruthii*	4–8	–
	globemallow	SPHAE	*Sphaeralcea*	5	–
	four o'clock	MIRAB	*Mirabilis*	1–2	–
Shrub/Vine					
6	**half-shrub increasers**			15–20	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	10–20	–
	prairie sagewort	ARFR4	*Artemisia frigida*	5–10	–
7	**cool-season decreasers**			10–25	
	skunkbush sumac	RHTR	*Rhus trilobata*	10–15	–
	hairy mountain mahogany	CEMOP	*Cercocarpus montanus var. paucidentatus*	0–10	–
8	**warm-season decreasers**			15–25	
	fourwing saltbush	ATCA2	*Atriplex canescens*	10–15	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	5–10	–
9	**succulents**			20–30	
	pricklypear	OPUNT	*Opuntia*	10–15	–
	yucca	YUCCA	*Yucca*	10–15	–
10	**warm-season increasers**			25–35	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	10–15	–
	desert-thorn	LYCIU	*Lycium*	5	–
	Sonoran scrub oak	QUTU2	*Quercus turbinella*	2–5	–
	currant	RIBES	*Ribes*	5	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	3–5	–
Tree					
11	**conifers**			757–2295	
	twoneedle pinyon	PIED	*Pinus edulis*	451–1368	–
	oneseed juniper	JUMO	*Juniperus monosperma*	306–927	–

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 map units. Livestock use depends on the development of man-made watering facilities (wells or stock tanks). Livestock have been in various parts of these map units for over a century, and their influence on the land and vegetation is evident (decreased herbaceous plant diversity, sheet or gully erosion, broken fire cycle, lack of fine fuels for natural fires). Currently stocking capacity for these map units is low due to low production of almost a homogenous stand of blue grama. Plant diversity could be sustained through all three states if livestock are managed properly, reduced stocking rates, planned grazing systems that afford substantial growing season rest and recovery after a grazing event, and reintroduction of fire into the ecosystem for nutrient cycling and maintain an open canopy level. The deteriorated condition in the woodland/savannah plant communities (States 2 and 3) requires a substantial amount of effort to rebuild the plant community structure and diversity while livestock grazing is ongoing.

Wildlife such as deer and elk utilize these areas for forage, escape cover, and thermal cover. It has been observed that cool-season species are mostly utilized by wildlife during fall, winter, and early spring. Competition for forage between livestock and wildlife can occur on this site, especially for cool-season grasses and shrubs.

Hydrological functions

Coarse fragments occur in very minimal amounts, except on a few soil map units. Soils are either sandy loam or fine sandy loam. A few soils contain gravelly, cobbly, or stony surface textures. Most soils are well drained and allow for water to filter through the profile and recharge the water table. Excessive moisture contributes to surface flow and subsequent soil erosion (sheet or gully).

Several of the soil map units do not have well defined drainage patterns, and springs or sustained stream flows are not expected to occur on these soils map units. Some of the soils have very good water holding capacity while others do not. The deeper soils at higher elevation and precipitation zones have the ability to produce greater tree densities and larger diameter trees, whereas other sites at lower elevation appear to be harsher (shallow soil or drier) resulting in stunted tree growth.

Recreational uses

These map units collectively are conducive to recreational opportunities such as camping and firewood gathering. The woodland/savannah plant communities also provide thermal and nesting cover for wildlife and may provide hunting opportunities at certain times of the year.

Most map units are not steep and are readily accessible to vehicles or off-road vehicles. There is sufficient grade on the landscape that proper road placement and construction would be prudent to avoid accelerating soil erosion. Scenic values are not that high, and changing the vegetative patterns across the landscape would not change the scenic rating significantly.

Wood products

Many of the sites produce a substantial amount of wood fiber, both in the HCPC or in the PNC deteriorated states. The map units are readily accessible making them a good source for both commercial and individual firewood gathering. The sites also produce sufficient seedling, saplings in State 2, which may provide an opportunity for commercial harvesting of root stock for commercial landscaping. Some sites may produce up to 2 cords of firewood per acre per year, based on a 150-year rotation cycle, harvesting only the old growth age class trees in the stand.

Wood posts and stays could also be derived from the woodland/savannah plant communities but the volume and quality may vary significantly between soil map units due to varying height, density, and age class of trees across the landscape. Few of the oneseed juniper are straight enough for posts, but generally good enough for stays. Limited amounts of alligator and Rocky Mountain junipers are available on certain soil map units (340, 341, 700) but harvesting
opportunities may be restricted by the lack of sustained volume.

Other products

n areas where ponderosa pine exists as an anomaly in the stands, selective cutting could provide additional firewood volume, as well as incidental sawtimber or vigas for commercial sale. The potential revenues drawn from the sale of the trees may not substantiate the cost for creating access to remove the trees as well as the added soil disturbance associated with road building and harvesting. Ponderosa pines do serve as raptor and cavity nesting platforms in addition to providing a vegetative diversity on the landscape.

Other information

Historical and current grazing impacts have significantly altered the plant composition on many of the soil mapping units. Restoration efforts will entail a long-term recovery process to restore the native plant structure in any of the states desired. Reseeding will be an integral part of the recovery process.

Inventory data references

Interpretive Plant Community: Four soil map units were sampled to determine stand density, age structure, and tree species dominance (by frequency and canopy cover). This data was used to estimate HCPC plant composition and stand structure. The data was summarized and collectively used to estimate successional pathways as well. The four map units sampled are #340, 580, 335, and 655, with a total of 10 plots sampled, varying in aspect and elevation.

This ESD is derived from interpretation of 4 selected study sites within 4 soil map units, all occurring on BLM lands. Fixed study plots were measured in each of the study sites as well as understory vegetation sampling conducted in association with the study plots. MU 340 contained 5 study plots, MUs 335 and 580 contained two study plots each, and MU 655 contained three study plots. The data gathered was summarized and averaged to extrapolate its relevance across all of the remaining soil mapping units considered in this ESD. Each study plot had one 0.1-acre plot measured and the data summarized per study site. Sites were not selected randomly. They were selected based on best representation of the landscape and to maintain consistency within the soil mapping unit.

Other references

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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:**
