

**Ecological site DX035X03B817****Loamy Slopes****17-25" p.z.****Cobbly (PIPO)**

Last updated: 5/20/2025

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**General information**

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

**MLRA notes**

Major Land Resource Area (MLRA): 035X–Colorado Plateau

This ecological site occurs in Common Resource Area 35.8 - the Colorado Plateau Ponderosa Pine Forests The Common Resource Area occurs within the Colorado Plateau Physiographic Province. Elevations range from 6800 to 8500 feet and precipitation averages 17 to 25 inches per year. Vegetation includes ponderosa pine, white fir, aspen, pinyon, juniper, Gambel oak, big sagebrush, ceanothus, blue elderberry, muttongrass, upland sedge, and big wildrye, mountain muhly, Arizona fescue, pine dropseed, and blue grama. The soil temperature regime ranges from mesic to frigid and the soil moisture regime is typic ustic. This unit occurs within the Colorado Plateau Physiographic Province and is characterized by a sequence of flat to gently dipping sedimentary rocks eroded into plateaus, valleys and deep canyons. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin.

**Ecological site concept**

The soils on this ecological site are moderately deep to very deep. They are very flaggy to very cobbly throughout the soil profile. Surface textures range from very flaggy fine sandy loam to cobbly loamy sand. This ecological site occurs on steep knolls, footslopes, hills and backslopes of stable landslides and plateaus. Slopes average 15 to 60 percent, but can be steeper in spots.

Table 1. Dominant plant species

Tree	(1) <i>Pinus ponderosa</i> (2) <i>Pseudotsuga menziesii</i> var. <i>glauca</i>
Shrub	(1) <i>Quercus gambelii</i> (2) <i>Purshia tridentata</i>
Herbaceous	(1) <i>Poa fendleriana</i> (2) <i>Carex geophila</i>

**Legacy ID**

F035XH817AZ

**Physiographic features**

This ecological site occurs on steep knolls, footslopes, hills and backslopes of stable landslides and plateaus. Slopes average 15 to 60 percent, but can be steeper in spots. The soils are very flaggy to very cobbly throughout the soil profile. Surface textures range from loamy sands to fine sandy loams. Subsurface textures range from sandy loams to sandy clay loams.

Table 2. Representative physiographic features

Landforms	(1) Knoll (2) Ridge (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	2,320 – 2,590 m
Slope	20 – 60 %
Aspect	Aspect is not a significant factor

### Climatic features

Winter-Summer moisture ratios are typically 70:30 on the west side of this CRA and shift to 60:40 on the east side. Late spring is usually the driest period and early fall moisture can be sporadic. Summer rains fall from June through September; moisture originates in the Gulf of Mexico and creates convective, usually brief, intense thunderstorms. Cool season moisture from October through May tends to be frontal; it originates in the Pacific and the Gulf of California and falls in widespread storms with longer duration and lower intensity. Precipitation generally comes as snow from October into April. Snowpack can persist for 3-4 months, although it may disappear in exposed areas during prolonged dry weather. Summer daytime temperatures are typically 80-90 F but can exceed 95 F. Winter temperatures around 0 F are common and can reach -25 F.

Table 3 Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	130 days
Precipitation total (average)	640 mm

### Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. The sandy surface texture of the soil allows the site to capture the majority of both gentle winter storms and intense summer thunderstorms with little runoff.

### Soil features

The soils on this ecological site are moderately deep to very deep. Surface textures range from very flaggy fine sandy loam to cobbly loamy sand. Subsoil textures range from gravelly sandy clay loam to very channery loamy sand. Parent material is aluvium and residuum from sandstone, basalt, and tuff-breccia.

Available water capacity is very low to moderate. Water erosion hazard is moderate to high; wind erosion is slight to high. Soils are non-saline and non-sodic. pH range is 6.1-8.4.

Soil survey map unit components that have been correlated to this ecological site include:

SSA-715 Ft. Defiance Area AZ/NM 068-Narbona family, 113-Sonsela;

SSA-717 Shiprock Area AZ/NM 600 & 614 Kunz,  
606 & 608 Narbona, 610 & 612 Xankey, 71S onsela and 608 Zilditloi.

**Table 4. Representative soil features**

Parent material	(1) Alluvium – basalt (2) Residuum – sandstone
Surface texture	(1) Very flaggy fine sandy loam (2) Very flaggy loam (3) Very cobbly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to rapid
Soil depth	100 – 200 cm
Surface fragment cover <=3"	0 – 40 %
Surface fragment cover >3"	0 – 50 %
Available water capacity (0-101.6cm)	5.08 – 25.4 cm
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 40 %
Subsurface fragment volume >3" (Depth not specified)	0 – 60 %

**Ecological dynamics**

An ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Spatial boundaries of the communities; however, can be recognized by characteristic patterns of species composition, association, and community structure. The historic climax plant community for this ecological site has been described by sampling relict or relatively undisturbed sites and/or reviewing historic records. The historic climax plant community is the plant community that evolved over time with the soil forming process and long term changes in climatic conditions of the area. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site.

Natural disturbances, such as drought, fire, grazing of native fauna, and insects, are inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the ecological site. Fluctuations in plant community structure and function caused by the effects of natural disturbances help establish the boundaries and characteristics of an ecological site. They are accounted for as part of the range of characteristics of the ecological site. Recognizable plant community phases are identified in the reference state of the ecological site. Some sites may have a small range of variation, while others have a large range. Some plant community phases may exist for long periods of time, while others may only occur for a couple of years after a disturbance.

Deterioration of the plant community, hydrology, or soil site stability on an ecological site can result in crossing a threshold or potentially irreversible boundary to another state, or equilibrium. This can occur as a result of the loss of soil surface through erosion, the loss of the stability of the site due to disturbances that cause active erosion on the site, increases in the amounts and/or patterns or runoff from rainstorms, changes in availability of surface and subsurface water, significant changes in plant structural and functional types, or the introduction of non-native species. When these thresholds are crossed, the potential of the ecological site to return to the historic climax plant community can be lost, or restoration will require significant inputs. There may be multiple states possible for an ecological site, determined by the type and or severity of disturbance.

The known states and transition pathways for this ecological site are described in the state and transition model. Within each state, there may be one or more known plant community phases. These community phases describe the different plant community that can be recognized and mapped across this ecological site. The state and transition model is intended to help land users recognize the current plant community on the ecological site, and the management options for improving the plant community to the desired plant community.

Plant production information in this site description is standardized to the annual production on an air-dry weight basis in near normal rainfall years.

## State and transition model

Figure 3. 358 CobblySlopesPIPO S&T

## Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Grasses</b>			101-235	
	muttongrass	POFE	<i>Poa fendleriana</i>	11-84	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	6-62	–
	White Mountain sedge	CAGE	<i>Carex geophila</i>	6-56	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	6-22	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	6-11	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	6-11	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	6-11	–
<b>Forb</b>					
2	<b>Forbs</b>			34-78	
	Forb, perennial	2FP	<i>Forb, perennial</i>	3-17	–
	fleabane	ERIGE2	<i>Erigeron</i>	3-17	–
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	3-17	–
	silvery lupine	LUAR3	<i>Lupinus argenteus</i>	6-17	–
	ragwort	SENEC	<i>Senecio</i>	3-17	–

Shrub/Vine				
3	<b>Shrubs</b>			174-387
	Gambel oak	QUGA	<i>Quercus gambelii</i>	45-196
	creeping barberry	MARE11	<i>Mahonia repens</i>	45-67
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	45-67
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	34-56
4	<b>Succulents</b>			11-45
	Navajo yucca	YUBA2	<i>Yucca baileyi</i>	11-45
Tree				
5	<b>Trees</b>			17-39
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	6-11
	Rocky Mountain Douglas-fir	PSMEG	<i>Pseudotsuga menziesii var. glauca</i>	6-11
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	3-10
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	3-10

Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
ponderosa pine	PIPO	<i>Pinus ponderosa</i>	Native	1.5-21.3	30-45	20.3-38.1	-
Rocky Mountain Douglas-fir	PSMEG	<i>Pseudotsuga menziesii var. glauca</i>	Native	1.5-19.8	5-10	10.2-30.5	-

Table 7. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (m)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
muttongrass	POFE	<i>Poa fendleriana</i>	Native	-	10-20
Shrub/Subshrub					
Gambel oak	QUGA	<i>Quercus gambelii</i>	Native	0.3-6.1	30-40

Table 8. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.1 plant community composition

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

Site has steep slopes and moderate production of forage. Cattle, sheep, goats and horses can graze in summer and fall. Slopes are steep and soils are rocky which hinder livestock movement and proper use. Young trees should not be grazed. Water availability for wildlife comes from springs or man-made watering facilities. Cover is good for most species. A good variety of understory species makes forage good. Topography provides escape habitat.

## Recreational uses

Recreational activities include hiking, wildlife observations and hunting. Landscape quality is good.

## Wood products

Site is suitable for crawler-tractor type equipment for site preparation and precommercial thinning. Tree planting should be done by hand. Equipment is limited by steep slopes. Unsurfaced roads are hindered by steep slopes, flaggs, cobbles and rock. Water erosion is moderate to high in cutover areas/bare ground and roads/trails/landings as steep slopes will accelerate erosion. Wind erosion is slight to high. Soil compaction potential is good because the soil and rock mix well. Rutting potential is low due to rocky material in the soil. Revegetation potential is low because of steep slopes and rocky soils. Harvest trees on a sustained yield basis Steep slopes, rocky surfaces make harvesting difficult. Prescribed burning is not recommended. Mechanical tree removal is not recommended due to steep slopes and rocky soils. Control pests to prevent tree damage and loss. Fire hazard is low as the fuel load is usually low. Replanting suitability is poor. Seedling mortality is moderate. Natural regeneration is slow, but will occur in time. Seedlings should not be grazed. Plant competition is moderate to severe. Windthrow hazard is slight because of good rooting depth.

**Table 11. Representative site productivity**

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
ponderosa pine	<i>PIPO</i>	65	70	300	335	70	–	–	
ponderosa pine	<i>PIPO</i>	65	70	325	335	–	–	–	
Rocky Mountain Douglas-fir	<i>PSMEG</i>	60	66	240	250	–	–	–	
Rocky Mountain Douglas-fir	<i>PSMEG</i>	60	66	225	250	65	–	–	

### Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T22N R19W S17
General legal description	Toadlena Quad, Chuska Mountains, Navajo Reservation.

### Other references

Updates and revisions for this ESD were conducted as part of a 2007-2012 Interagency Technical Assistance Agreement between the Bureau of Indian Affairs–Navajo Region and the NRCS-Arizona.

### Contributors

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### Approval

Kendra Moseley, 5/20/2025

### 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)	
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Contact for lead author	
Date	06/18/2026
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

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

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

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

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

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

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

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

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

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

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**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:

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