

Ecological site DX035X03B812

Sandy Upland

17-25" p.z. (PIPO)

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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

Soils grouped in this site are moderately deep to very deep. Surface textures range from loamy fine sand to fine sandy loam. Parent material is alluvium from sandstone and basalt. This ecological site occurs on fan terraces and toeslopes of stable landslides, mountains and plateaus. Slopes are generally 0 to 15 percent, but may be slightly steeper in spots. The site does not benefit significantly from run-on moisture from other sites.

Table 1. Dominant plant species

Tree	(1) <i>Pinus ponderosa</i> (2) <i>Pseudotsuga menziesii</i>
Shrub	(1) <i>Quercus gambelii</i> (2) <i>Ceanothus fendleri</i>
Herbaceous	(1) <i>Carex geophila</i> (2) <i>Lupinus argenteus</i>

Legacy ID

F035XH812AZ

Physiographic features

This site occurs on fan terraces and toeslopes of stable landslides, mountains and plateaus. Slopes are generally 0 to 15 percent, but may be slightly steeper in spots. The soils are deep. Surface textures range from loamy fine sand to fine sandy loam. The site does not benefit significantly from run-on moisture from other sites.

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Plateau (3) Structural bench
Flooding frequency	None
Ponding frequency	None
Elevation	2,320 – 2,590 m
Slope	0 – 20 %
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

This site occurs in an upland position. The soil moisture on this ecological site comes from precipitation. It neither benefits from run-in moisture nor sustains excessive runoff.

Soil features

Soils are moderately deep to very deep. Surface textures range from loamy fine sand to fine sandy loam. Subsurface textures range from loamy fine sand to fine sandy loam. Parent material is alluvium from sandstone and basalt.

Water erosion hazard is slight to moderate; wind erosion is very high to high. Soils are non-saline, non-sodic. pH range is 5.6-7.3. Available water capacity is very low to very high. Soil moisture regime is typic ustic; temperature regime is frigid.

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

SSA-713 Chinle Area MU 59-Typic Ustipsamments;

SSA-715 Ft. Defiance Area NM/AZ 51-Sandark family;

SSA-717 Shiprock Area AZ/NM MU's 604 & 606 Sandark.

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone (2) Residuum – basalt
Surface texture	(1) Loamy fine sand (2) Sand (3) Fine sandy loam
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Moderately slow to rapid
Soil depth	100 – 200 cm
Surface fragment cover <=3"	0 – 10 %
Available water capacity (0-101.6cm)	5.08 – 25.4 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 7.3
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %

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 SandyUpland S&T

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Common Perennial Grasses/Grasslikes			138-207	
	nodding brome	BRAN	<i>Bromus anomalus</i>	35-103	–
	White Mountain sedge	CAGE	<i>Carex geophila</i>	35-103	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	35-69	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	7-69	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	7-69	–
2	Ocassional Perennial Grasses			35-69	
	pine dropseed	BLTR	<i>Blepharoneuron tricholepis</i>	0-35	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-35	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0-35	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0-35	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-20	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0-20	–
3	Others Grasses			0-20	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-20	–
	Grass, annual	2GA	<i>Grass, annual</i>	0-13	–
Forb					
4	Common Forbs			140-207	
	silvery lupine	LUAR3	<i>Lupinus argenteus</i>	35-69	–
	hairy brackenfern	PTAQP2	<i>Pteridium aquilinum var. pubescens</i>	35-69	–
	New Mexico groundsel	PANE7	<i>Packera neomexicana</i>	0-35	–

	woodland strawberry	FRVEB2	<i>Fragaria vesca ssp. bracteata</i>	0-35	-
	pineywoods geranium	GECA3	<i>Geranium caespitosum</i>	0-35	-
5	Occasional Forbs			35-69	
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	0-20	-
	pussytoes	ANTEN	<i>Antennaria</i>	0-20	-
	ragleaf bahia	BADI	<i>Bahia dissecta</i>	0-20	-
	winged buckwheat	ERAL4	<i>Eriogonum alatum</i>	0-20	-
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	0-20	-
	scarlet gilia	IPAG	<i>Ipomopsis aggregata</i>	0-13	-
	Wright's deervetch	LOWR	<i>Lotus wrightii</i>	0-13	-
	wild bergamot	MOFI	<i>Monarda fistulosa</i>	0-13	-
	catchfly	SILEN	<i>Silene</i>	0-13	-
	Mt. Albert goldenrod	SOSI3	<i>Solidago simplex</i>	0-13	-
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-13	-
	sanddune wallflower	ERCA14	<i>Erysimum capitatum</i>	0-13	-
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	0-13	-
	aspen fleabane	ERSP4	<i>Erigeron speciosus</i>	0-13	-
	yellow hawkweed	HIFE	<i>Hieracium fendleri</i>	0-13	-
	Mexican woollywhite	HYME	<i>Hymenopappus mexicanus</i>	0-13	-
	James' cryptantha	CRCI3	<i>Cryptantha cinerea</i>	0-13	-
	Carruth's sagewort	ARCA14	<i>Artemisia carruthii</i>	0-13	-
	tarragon	ARDR4	<i>Artemisia dracunculul</i>	0-13	-
	Fendler's sandwort	ARFE3	<i>Arenaria fendleri</i>	0-13	-
	Forb, annual	2FA	<i>Forb, annual</i>	0-7	-
Shrub/Vine					
6	Shrubs			35-103	
	kinnikinnick	ARUV	<i>Arctostaphylos uva-ursi</i>	0-35	-
	Fendler's ceanothus	CEFE	<i>Ceanothus fendleri</i>	0-35	-
	creeping barberry	MARE11	<i>Mahonia repens</i>	0-35	-
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	0-20	-
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0-20	-
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0-20	-
	common juniper	JUCO6	<i>Juniperus communis</i>	0-20	-
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-20	-
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-13	-
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-13	-
	Forb, annual	2FA	<i>Forb, annual</i>	0-13	-
	Navajo yucca	YUBA2	<i>Yucca baileyi</i>	0-13	-
Tree					
7	Trees (<4.5')			138-207	
	Gambel oak	QUGA	<i>Quercus gambelii</i>	103-173	-
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0-35	-
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0-35	-
	quaking aspen	POTR5	<i>Populus tremuloides</i>	0-35	-
	Douglas-fir	PSME	<i>Pseudotsuga menziesii</i>	0-35	-

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

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

Site is suitable for grazing by cattle, sheep, goats and horses during summer or early fall before the tree canopy exceeds 50%. Management considerations include grazing systems, proper grazing, and avoiding livestock concentrations that would denude the vegetation exposing the soil to erosion. Grazing should not damage young trees. Water is found in scattered springs or man-made watering facilities. Cover for wildlife is good for most species. Food has good potential except where grazing is unmanaged. Topography provides escape habitat.

Recreational uses

Recreational activities include hiking, horseback riding, camping, hunting, wildlife observation and photography. Landscape quality is good.

Wood products

Rubber tired equipment is best on these sandy soils for harvesting, site preparation, tree planting and precommercial thinning. Caution should be used on loose sands. Slopes are non-restrictive. Equipment could get stuck in sand with continuous heavy use. Water erosion potential on cutover areas/bare ground/roads/trails/landings is slight to moderate. Wind erosion potential in this type of area is very high to high. Compaction potential is poor. Soils are too coarse to rut. Revegetation potential is fair to good due to water holding capacity. Harvest mature trees on a sustained yield basis. Final removal cuts and intermediate cuts are desirable. Thick stands need thinned to improve growth rate of trees left. Periodic ground fires will reduce dense understory vegetation competing for moisture. Loose sands are the only possible limitation to mechanical tree removal. Control unwanted pests to limit tree damage and loss. Fire hazard could become extreme if understory fuel load builds up. Replanting suitability is fair to good, drought sandy soils could be a problem. Seedling mortality is moderate to severe. Natural regeneration is slightly limited because of competition for moisture. Seedlings need protection from grazing. Dense grass and forb cover may impede regeneration. Windthrow hazard is slight; rooting depth is greater than 30".

Table 9. 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>	80	85	450	462	–	–	–	
quaking aspen	<i>POTR5</i>	80	87	325	330	–	–	–	
Rocky Mountain Douglas-fir	<i>PSMEG</i>	60	65	235	240	–	–	–	

Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T23N R20W S11
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.

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Approval

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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	05/15/2026
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:
