

Ecological site F035XF627AZ Sandstone Upland (JUOS, PIED) 13-17" p.z. (Provisional)

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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 35.6 - the Colorado Plateau Pinyon-Juniper-Sagebrush The Common Resource Area occurs within the Colorado Plateau Physiographic Province. Elevations range from 5800 to 7300 feet and precipitation averages 13 to 17 inches per year. Vegetation includes pinyon, juniper, big sagebrush, cliffrose, Mormon tea, muttongrass, prairie junegrass, squirreltail, western wheatgrass, and blue grama. The soil temperature regime is mesic and the soil moisture regime is aridic 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

“ATTENTION: This ecological site meets the requirements for PROVISIONAL (if not more). A provisional ecological site is established after ecological site concepts are developed and an initial state-and-transition model is drafted. A provisional ecological site typically will include literature reviews, land use history information, legacy data (prior approved range site descriptions, forage suitability groups, woodland suitability groups, etc.), , and includes some soils data, and estimates for canopy and/or species composition by weight,. A provisional ecological site provides the conceptual framework of soil-site correlation for the development of the ESD. For more information about this ecological site, please contact your local NRCS office.”

Associated sites

DX035X03B628	<p>Sandy Loam Upland (JUOS, PIED) 13-17" p.z.</p> <p>This site can lie above the referenced site, where deeper soils have developed.</p>
R035XF601AZ	<p>Sedimentary Cliffs 13-17" p.z.</p> <p>This site usually lies below the referenced site.</p>
R035XF606AZ	<p>Sandy Loam Upland 13-17" p.z.</p> <p>This site can lie above the referenced site, where deeper soils have developed.</p>
DX035X03G618	<p>Sandy Upland 13-17" p.z. Moderately Deep</p> <p>This site can lie above the referenced site, where deeper soils have developed.</p>

Table 1. Dominant plant species

Tree	(1) <i>Juniperus osteosperma</i> (2) <i>Pinus edulis</i>
Shrub	(1) <i>Artemisia tridentata ssp. wyomingensis</i> (2) <i>Ephedra viridis</i>
Herbaceous	(1) <i>Poa fendleriana</i>

Physiographic features

The site consists of shallow to very shallow, well-drained soils that formed in eolian and alluvial deposits on plateaus and mesas and residuum derived from weathered sandstone. It is often located parallel to mesa and plateau rims, but can also be found on mesa tops where soils are shallow and rock outcrops common. This site receives runoff from sites with deeper soils above it. This site has high runoff potential so it will generate runoff to sites that lie below it.

Slopes are normally 1-15%, but they may range up to 25%.

Table 2. Representative physiographic features

Landforms	(1) Cuesta (2) Plateau (3) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	1,770 – 2,230 m
Slope	0 – 20 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of this land resource unit is semiarid with warm summers and cool winters. The mean annual precipitation ranges from 13 – 17 inches, but it is very erratic, often varying substantially from year to year. The majority of the precipitation comes from October through April. This precipitation comes as gentle rain or snow from frontal storms coming out of the Pacific Ocean. Snow is common from November through February. Generally no more than a few inches of snow accumulates, melting within a few days, but may last a week or more. The remaining precipitation comes from July through September as spotty, unreliable and sometimes violent thunderstorms. The moisture for this precipitation originates in the Gulf of Mexico (and the Pacific Ocean in the fall) and flows into the area on the north end of the Mexican monsoon. Late May through late June is generally a dry period. The mean annual air temperature ranges from 47 to 49 degrees Fahrenheit (F). The frost-free period (air temperature > 32 degrees F) ranges from 113 to 144 days (@ 50 percent probability). Strong winds are common, especially in the spring.

Table 3 Representative climatic features

Frost-free period (average)	140 days
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Freeze-free period (average)	160 days
Precipitation total (average)	430 mm

Influencing water features

This site receives runoff from sites with deeper soils above it. This site has high runoff potential so it will generate runoff to sites that lie below it.

Soil features

The soils of this site are very shallow to shallow. Surface textures may be gravelly fine sandy loam, channery fine sandy loam, very fine sandy loam and loam. Parent materials are fine-loamy eolian deposits and/or residuum weathered from sandstone. Depth to restrictive features is 10 to 18 inches. The saturated hydraulic conductivity (Ksat) for the solum is 0.60 to 2.00 inches per hour (4.23 to 14.11 micrometers per second). The Ksat for the restrictive layer is 0.00 to 2.00 inches per hour (0.00 to 1.40 micrometers per second). Shrink-swell potential is approximately 4.5 LEP (moderate). The hydrologic soil group is D. Rills and other water flow patterns may be common on steeper slopes due to the high amount of rock outcrop directing runoff to the soil and the low potential for vegetative growth on shallow and very shallow soils. Pedestals and terracettes may be common due to the moderate to high potential for wind erosion. There occasionally may be areas within the site, with sandy soil surface textures, that have small blowouts and/or minor depositional areas around rock outcrops and plant bases. Sandy loam and/or fine sandy loam textured soils associated with this site are not very susceptible to compaction. Loam textured soils associated with the site are somewhat susceptible to compaction. Biological crusts, including lichens and mosses, are important for the stability and function of the soil surface on this site, especially on very shallow soils that do not support very much vascular plant growth. Cyanobacteria are the most common crust component, followed by lichens and mosses. Biological crusts may comprise 20% of soil surface cover.

Soil map units correlated to this ecological site include:

SSA-682 Cibola County, NM MU's 025,581 Vessilla;
 SSA-692 McKinley County, NM MU's 350,565 Vessilla;
 SSA-711 Navajo Mountain Area MU's 2 Arabrab and 37 Parkwash;
 SSA-712 Canyon de Chelly NM MU 9 Gladel family, 12 Parkelei, 13 Parkelei & Todest family;
 SSA-713 Chinle Area MU's 5 Arabrab, 25 Gladel family, 40 Lithic Ustipsamments;
 SSA-715 Fort Defiance Area AZ/NM MU's 4 Atlatl & Nizhoni family, 32 Vessilla, 76 Evpark, 120 Vessilla;
 SSA-717 Shiprock Area AZ/NM MU's 400 Atlatl, 401 Vessilla, 406 Nizhoni, 408 Nizhoni.

Table 4. Representative soil features

Parent material	(1) Eolian deposits – sandstone
Surface texture	(1) Gravelly fine sandy loam (2) Channery fine sandy loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid

Soil depth	30 – 100 cm
Surface fragment cover <=3"	0 – 30 %
Surface fragment cover >3"	0 – 20 %
Available water capacity (0-101.6cm)	0 – 12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	0 – 40 %

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. 35.6 Sandstone Upland 13-17"p.z. (JUOS, PIED)

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Perennial Sodgrass			6-22	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	6-22	–
2	Perennial Bunchgrass			6-22	
	muttongrass	POFE	<i>Poa fendleriana</i>	6-11	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0-6	–
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	0-6	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	0-6	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0-6	–
Forb					
3	Perennial Forb			1-6	
	milkvetch	ASTRA	<i>Astragalus</i>	0-6	–
	mariposa lily	CALOC	<i>Calochortus</i>	0-6	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-6	–
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	0-6	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-6	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-6	–
	scarlet gilia	IPAG	<i>Ipomopsis aggregata</i>	0-6	–
	bladderpod	LESQU	<i>Lesquerella</i>	0-6	–
	beardtongue	PENST	<i>Penstemon</i>	0-6	–
	pygmy fameflower	PHBR16	<i>Phemeranthus brevifolius</i>	0-6	–
	thrift mock goldenweed	STARA	<i>Stenotus armerioides var. armerioides</i>	0-6	–
4	Annual Forb			1-6	
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-6	–
	wedgeleaf draba	DRCUC	<i>Draba cuneifolia var. cuneifolia</i>	0-6	–
	flatspine stickseed	LAOCO	<i>Lappula occidentalis var. occidentalis</i>	0-6	–

	kiss me quick	POPI3	<i>Portulaca pilosa</i>	0-6	-
Shrub/Vine					
5	Low Shrub			67-673	
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	56-560	-
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	0-224	-
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0-56	-
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0-11	-
	Cutler's jointfir	EPCU	<i>Ephedra cutleri</i>	0-11	-
6	Tall Shrub			1-22	
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	0-11	-
	alderleaf mountain mahogany	CEMOM4	<i>Cercocarpus montanus var. montanus</i>	0-11	-
	Bailey's rabbitbrush	CHBA11	<i>Chrysothamnus baileyi</i>	0-11	-
	mormon tea	EPVI	<i>Ephedra viridis</i>	0-11	-
	cliff fendlerbush	FERU	<i>Fendlera rupicola</i>	0-11	-
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	0-11	-
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	0-11	-
7	Succulent			1-6	
	Whipple cholla	CYWH	<i>Cylindropuntia whipplei</i>	0-22	-
	hedgehog cactus	ECHIN3	<i>Echinocereus</i>	1-6	-
	pricklypear	OPUNT	<i>Opuntia</i>	1-6	-
	banana yucca	YUBA	<i>Yucca baccata</i>	1-6	-
Tree					
8	Tree			336-1121	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	112-504	-
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	112-504	-
	Gambel oak	QUGA	<i>Quercus gambelii</i>	22-112	-
	singleleaf ash	FRAN2	<i>Fraxinus anomala</i>	0-11	-

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 1.4 plant community composition

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

1. Livestock a. Suitability for grazing: Poor to fair; steep slopes and low forage production. b. Kind of livestock: Cattle, sheep, goats, and horses. c. Season of use: Late spring, summer, and fall. d. Management considerations: Grazing systems, proper grazing use. Young trees should not be grazed. Steeper slopes will limit livestock use. 2. Wildlife: a. Water: Scattered springs and pockets. b. Cover: Good for most species. c. Food: Good diversity. d. Other: Topography provides escape habitat. Wildlife found on this ecological site include: mule deer, coyote, snakes, lizards, cottontail rabbit, blacktail jackrabbit, elk.

Recreational uses

Recreational activities: Hiking, horseback riding, wildlife observations and photography.

Wood products

Woodland 1. Equipment and Operability Considerations -- a. Suitable equipment for: 1) Harvesting: All kinds; use crawler type or rubber tread equipment. 2) Site Preparation: All kinds. 3) Tree planting: All kinds; shallow soils and slopes restrict planting. 4) Precommercial thinning: All kinds; slope limits use of wheeled equipment. b. Equipment limitations: 1) Slope: Slopes over 20% limit rubber tread equipment; use crawler tractors. 2) Unsurfaced roads: Steeper slopes would be a limiting factor. 3) Stominess/rock outcrop: Rock outcrop on steep slopes limits use. 4) Water table/flooding: None. 2. Erosion Potentials -- a. Cutover areas/bare ground: Water and wind erosion will occur. b. Roads/trails/landings: Water and wind erosion will occur; water erosion on steeper slopes will be accelerated. 3. Soil management -- a. Compaction potential: Fair, soils don't bind together very well. b. Rutting potential: Soils will rut when wet. c. Revegetation potential: Poor because of shallow soil and steep slopes. 4. Silvicultural potentials and limitations -- a. Harvest cutting: Harvest mature trees when canopy exceeds 45% and on slopes less than 25% b. Thinning and Improvement: Cutting posts (juniper) and Christmas trees (pinyon) will improve wood growth on trees left. c. Prescribed burning: Not recommended. Mechanical tree removal: Not practical; shallow soils and steep slopes limit equipment use. d. Suitability for replanting: Poor; shallow soils and steep slopes. e. Seedling mortality: Very shallow and shallow soils make a severe mortality. f. Natural regeneration: Slow, but will occur in time. g. Seedling protection: Seedlings should be protected from grazing. h. Plant competition: Severe because of competition for limited moisture. i. Windthrow hazard: Slight; even though soils are shallow, trees root in cracks of sandstone.

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
Utah juniper	<i>JUOS</i>	30	35	3	3	–	–	–	
twoneedle pinyon	<i>PIED</i>	30	35	3	3	–	–	–	

Type locality

Location 1: Apache County, AZ	
Township/Range/Section	T38 N. R29 E. S22
General legal description	Boiling Over Well 7 1/2 min. quad. 7 miles north of Cove, Arizona, 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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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:
