USDA Natural Resources Conservation Service

Ecological site F035XF614AZ
Loamy Upland 13-17" p.z. Gravelly (PIED, JUOS)

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

AZ CRA 35.6 - Colorado Plateau Pinyon-Juniper-Sagebrush

Elevations range from 5500 to 7000 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.

Table 1. Dominant plant species

Tree	(1) *Pinus edulis* (2) *Juniperus osteosperma*
Shrub	(1) *Artemisia tridentata ssp. wyomingensis* (2) *Purshia stansburiana*
Herbaceous	(1) *Poa fendleriana* (2) *Pleuraphis jamesii*

Physiographic features

Site is located on footslopes, toeslopes, fan terraces of colluvial slopes at the base of cliffs and hills.

Table 2. Representative physiographic features

Landforms	(1) Cliff (2) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,707–1,981 m
Slope	2–20%
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)	144 days
Freeze-free period (average)	160 days
Precipitation total (average)	432 mm

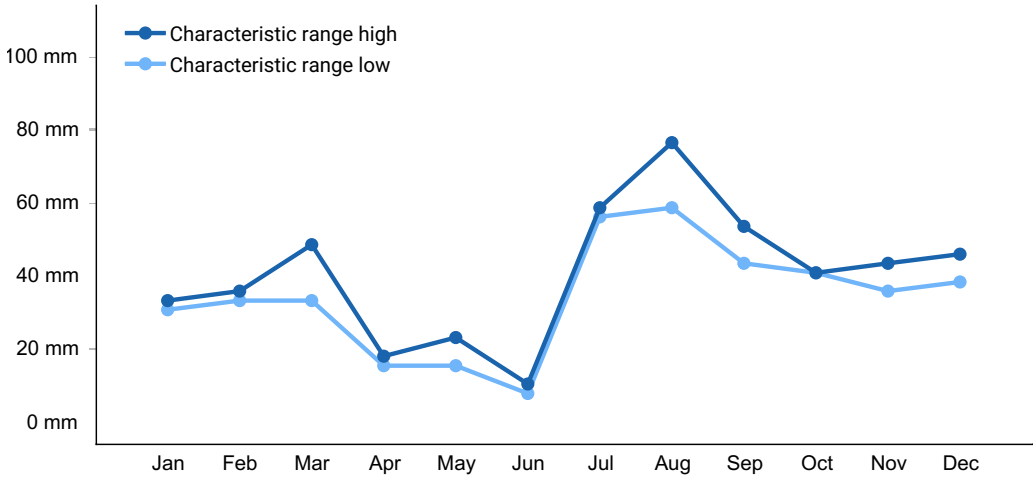

Figure 1. Monthly precipitation range

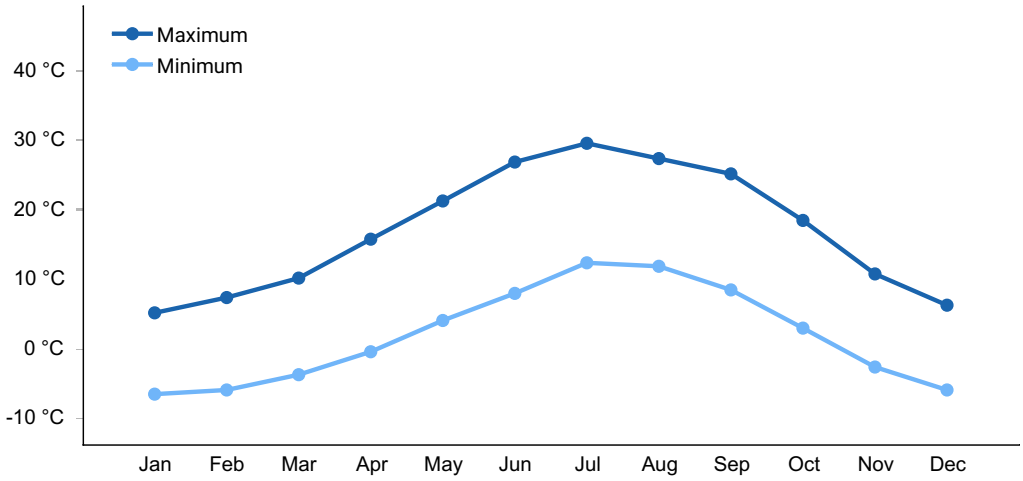

Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

Soils are very deep. Surface textures are extremely gravelly fine sandy loam, very gravelly fine sandy loam, extremely gravelly loam, gravelly loam, loam and very gravelly loam. Subsurface textures are very gravelly loam, very cobbly loam, very gravelly sandy clay loam, extremely gravelly coarse sandy loam, loam, clay loam and gravelly clay. Parent materials are alluvium, colluvium from limestone and sandstone. Geologic formation is Quaternary colluvium, alluvium from Kaibab limestone. Water erosion potential is slight to severe. Wind erosion potential is slight to moderate. Soils are non-saline, non-sodic with pH range of 6.1-8.4. Available water capacity is low to high.

Typical taxonomic units include:

SSA-623 Shivwits Area MU's 25 Goesling, 94 Katzine;
SSA-625 Mohave County NE part MU 57 Section;
SSA-629 Coconino County N. Kaibab part MU's 13, 14 & 17 Disterheff;

SSA-699 Hualapai/Havasupai area MU's 24 Mextank, Lykorly & Disterheff;
SSA-701 Grand Canyon area MU 171 Katzine;
SSA-717 Shiprock Area MU's 402 & 403 Chazner, 404 Tsezhin.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and sandstone
Surface texture	(1) Very cobbly fine sandy loam (2) Extremely gravelly fine sandy loam (3) Extremely gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	152–178 cm
Surface fragment cover <=3"	10–55%
Surface fragment cover >3"	5–40%
Available water capacity (0-101.6cm)	6.35–25.4 cm
Calcium carbonate equivalent (0-101.6cm)	3–35%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	15–55%
Subsurface fragment volume >3" (Depth not specified)	0–35%

Ecological dynamics

For state and transition model refer to Ecological Group ID DX035X02EESG20, Arizona Strip - Aridic Ustic - Limestone or Loamy Upland.

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The Historical Climax Plant Community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is

disturbed by factors such as fire, grazing, or drought.

Production data provided in this site description is standardized to air dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity index, compare the production (air dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum amount shown for each group. Divide the resulting total by the total normal year production shown in the plant community description. If the rainfall has ben significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

State and transition model

Ecosystem states

1. Historic Climax Plant Community

State 1 submodel, plant communities

1.1. Historic Climax Plant Community

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

The potential plant community consists of appx. 60% tree canopy cover over an

understory of grasses, forbs, shrubs and small trees. In the herbaceous/shrub stage, shrubs and grasses dominate with some tree seedlings and forbs present. In the immature stage, medium sized trees are competing with shrubs. Grasses and some forbs are present. In the mature/climax stage, trees are dominant. Shrubs will dominate the understory; grasses and forbs are few.

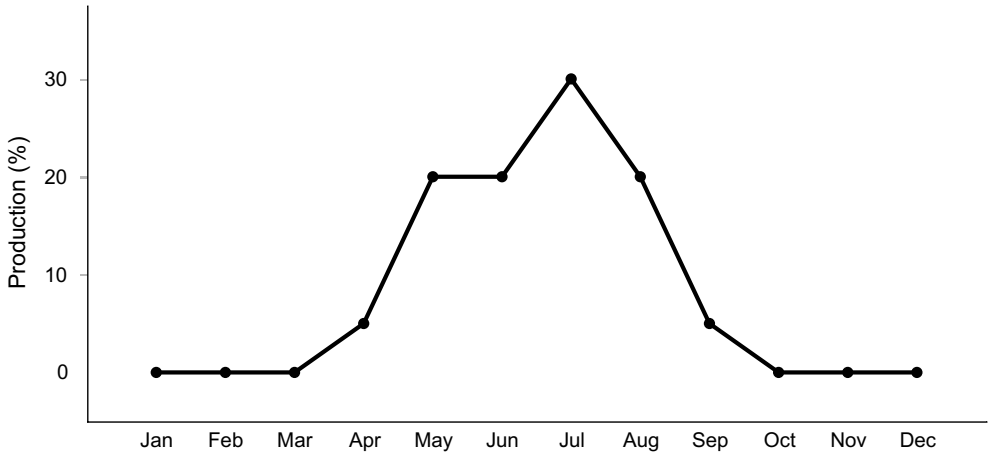

Figure 3. Plant community growth curve (percent production by month). AZ3512, 35.6 13-17" p.z. Stansbury cliffrose. Growth begins in spring and continues through the summer. Stem elongation, flowering, and seed set occur in summer..

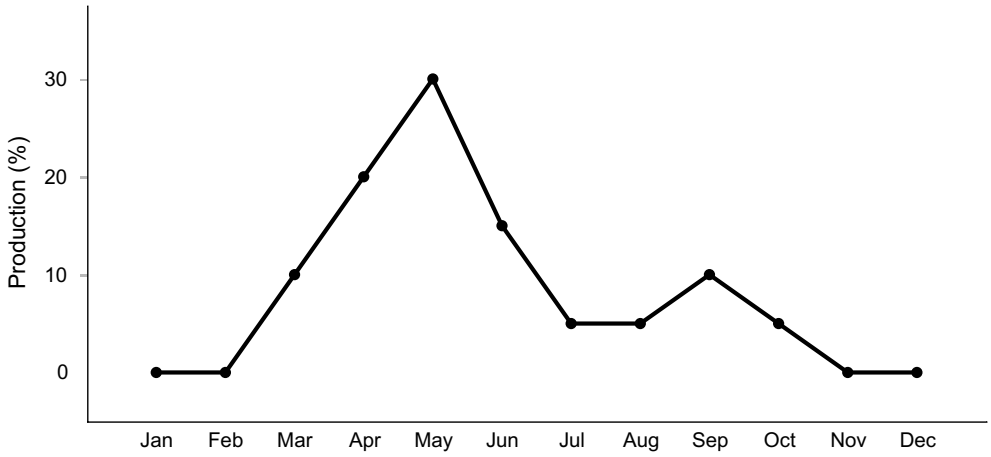

Figure 4. Plant community growth curve (percent production by month). AZ3602, 35.6 13-17" p.z. muttongrass. Most growth occurs in early to mid spring, plants may be green in the fall. Seed set occurs by summer..

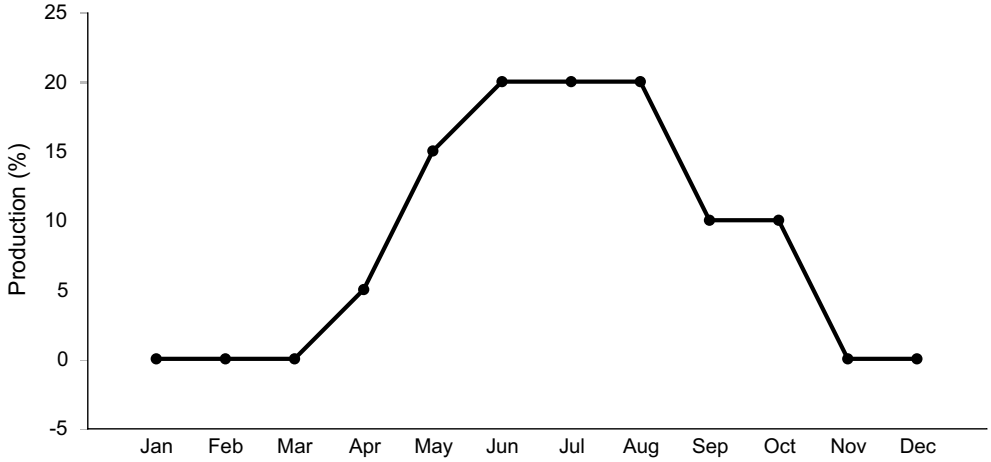

Figure 5. Plant community growth curve (percent production by month). AZ3603, 35.6 13-17" p.z. Wyoming big sagebrush. Most growth occurs in the summer. Seed set occurs in the fall..

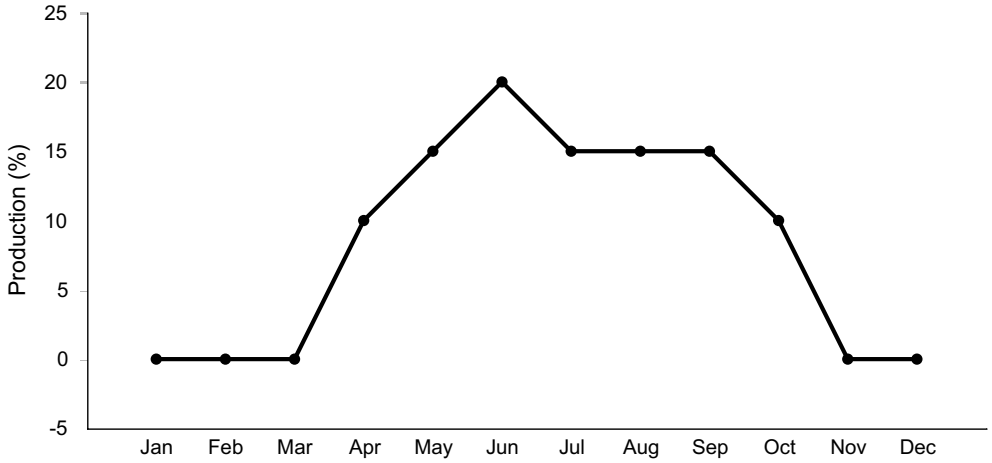

Figure 6. Plant community growth curve (percent production by month). AZ3929, 35.6 13-17" p.z. turbinella oak. Growth begins in spring and continues through the summer. Seed set occurs in the fall..

Additional community tables

Table 5. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)	Diameter (Cm)	Basal Area (Square M/Hectare)
Tree							
twoneedle pinyon	PIED	*Pinus edulis*	Native	1.5–9.1	20–40	10.2–38.1	–
Utah juniper	JUOS	*Juniperus osteosperma*	Native	0.3–4.9	20–40	7.6–30.5	–

Table 6. Community 1.1 forest understory composition

Common Name	Symbol	Scientific Name	Nativity	Height (M)	Canopy Cover (%)
Grass/grass-like (Graminoids)					
James' galleta	PLJA	*Pleuraphis jamesii*	Native	0–0.3	3–7
muttongrass	POFE	*Poa fendleriana*	Native	0–0.3	1–3
Forb/Herb					
Wright's bird's beak	COWR2	*Cordylanthus wrightii*	Native	0.2–0.8	1–2
Siler's penstemon	PELIS	*Penstemon linarioides ssp. sileri*	Native	0.1–0.5	1–2
phlox	PHLOX	*Phlox*	Native	0.1–0.3	1–2
Shrub/Subshrub					
Sonoran scrub oak	QUTU2	*Quercus turbinella*	Native	0.3–1.8	5–10
mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	Native	0.3–0.8	5–10
Stansbury cliffrose	PUST	*Purshia stansburiana*	Native	0.3–1.8	2–8
broom snakeweed	GUSA2	*Gutierrezia sarothrae*	Native	0.1–0.3	2–5
Utah serviceberry	AMUT	*Amelanchier utahensis*	Native	0.3–1.2	1–5
fourwing saltbush	ATCA2	*Atriplex canescens*	Native	0.2–0.8	2–5
tulip pricklypear	OPPH	*Opuntia phaeacantha*	Native	0.1–0.6	1–4
banana yucca	YUBA	*Yucca baccata*	Native	0–0.8	1–2
Tree					
Utah juniper	JUOS	*Juniperus osteosperma*	Native	0.3–4.6	20–40
twoneedle pinyon	PIED	*Pinus edulis*	Native	1.2–7.6	20–40
Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	Native	0.6–2.4	10–15

Animal community

Due to the thickness of trees, the site is only fairly suitable for grazing by cattle, sheep and horses in summer and fall. Management considerations are grazing systems, proper

grazing use and snow covered forage.

Water can be found in some springs and man-made water facilities. Elk and Deer use the site for winter cover. Food is adequate for native wildlife species. Topography provides escape habitat.

Recreational uses

Recreational activities include hiking, hunting, wildlife observations and photography. Aesthetic appeal is fair.

Wood products

Rubber-tired equipment is best used for harvesting & site preparation. All kinds of equipment is suitable to tree planting and precommercial thinning. Slopes of 15% may limit some equipment. Erosion potential is very slight. Rock litter protects the soils. Water erosion may occur on slopes over 10% however. Compaction potential is good. Rutting will occur when soils are wet. Revegetation potential is good.

Harvest mature trees when canopy exceeds 40%. Cut posts and Christmas trees to improve wood growth of the remaining trees. Prescribed burning is not recommended. Mechanical tree removal is practical, although gravel in soils may cause some difficulty. Control pests to prevent tree damage and loss. Fire hazard is medium due to dense shrub understory's potential to be a high fuel load. Replating potential is good, however gravel in soils may cause problems. Seedling mortality is moderate to severe. Natural regeneration is slow, but will occur in time. Seedlings should be protected from grazing. Plant competition is moderate as shrubs compete for moisture. Windthrow hazard is slight. Trees root well in the deep soils.

Table 7. 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
twoneedle pinyon	*PIED*	85	95	10	13	–	–	–	

Type locality

Location 1: Coconino County, AZ	
Township/Range/Section	T30N R8W S34
General legal description	Hockey Puck Spring Quad, 0.5 mile east of Mexican Tank; Sec 34, T30N, R8W; Hualapai Indian Reservation, AZ.

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	12/22/2025
Approved by	Kendra Moseley
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:**

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:**