

Ecological site R035XG706AZ Clayey Upland 14-18" p.z.

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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.

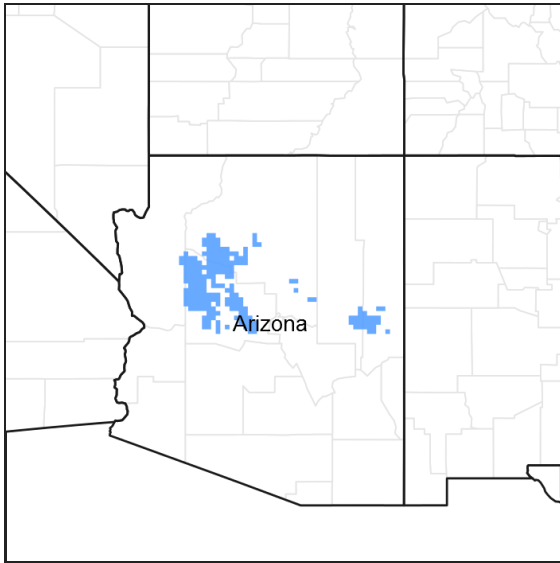


Figure 1. Mapped extent

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.

MLRA notes

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

AZ CRA 35.7 – Colorado Plateau Woodland – Grassland

Elevations range from 5000 to 7000 feet and precipitation averages 14 to 18 inches per year. Vegetation includes one-seed juniper, Colorado pinyon, Stansbury cliffrose, Apache plume, four-wing saltbush, green Mormon tea, needle and thread, sideoats grama, blue grama, black grama, galleta, bottlebrush squirreltail, and muttongrass. 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.

Associated sites

R035XG707AZ	Clay Loam Upland 14-18" p.z.
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Similar sites

R035XA106AZ	Clayey Upland 10-14" p.z.
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Table 1. Dominant plant species

Tree	(1) <i>Juniperus</i> (2) <i>Pinus edulis</i>
Shrub	(1) <i>Rhus trilobata</i> (2) <i>Mahonia fremontii</i>
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Bouteloua gracilis</i>

Physiographic features

This site occurs in an upland position on nearly level to steep mesa tops, fans and plains. It neither benefits significantly from run-in moisture from adjacent areas nor does it suffer from excessive loss from run-off unless denuded of its vegetation. It occurs on all exposures. Soils formed in material weathered from basalt and volcanic debris and sandstone.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Fan (3) Plain
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,134 m
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The climate of the land resource unit is semiarid with warm summers and cool winters. The mean annual precipitation ranges from 14 to 18 inches, but is very erratic, often varying substantially from year to year. The majority of the precipitation is received 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, approximately 40 percent, is received 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 temperature ranges from 46 to 52 degrees Fahrenheit (F). The frost-free period (air temperature > 32 degrees F) ranges from 108 to 151 days (@ 50 percent probability). Strong winds are common, especially in the spring.

Table 3. Representative climatic features

Frost-free period (average)	151 days
Freeze-free period (average)	170 days
Precipitation total (average)	457 mm

Influencing water features

Soil features

Soils are moderately deep to deep. Typically the soil surface is 4-8" thick and has textures of clay or occasionally

clay loam or silty clay. Rarely granular silty clay loam or heavy clay loam layers, not exceeding 2", are at the surface. The texture of underlying layers is silty clay or clay. Coarse fragments of gravel cobble or stone range from a few percent to as much as 40% by volume may occur on the surface. When dry, the soils associated with this ecological site have cracks that are commonly one inch or more wide and 20-36 inches deep. Runoff is very slow on dry soils, but it is moderate to high on moist soils. Infiltration rate of dry soil is very high, but that of moist soil is very low. Soils are neutral to moderately alkaline (pH 7.3-8.4) in reaction and soluble salt accumulations are low.

Typical taxonomic units include:

SSA-635 Apache County Central part- MU's Springerville (Sp and SRP);
 SSA-633 Navajo County Central part- MU's Springerville family (64), Thunderbird (65);
 SSA-631 Coconino County Central part – MU Springerville (49);
 SSA-637 Yavapai County Western Part - MU's Springerville (Cad, CbC, SIB, SmB, SnD, SpB, StB, and SuB);
 SSA-697 Mohave County Central part MU 4 Aridic Argiustolls.

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Cobbly clay (3) Silty clay
Family particle size	(1) Clayey
Permeability class	Slow to very slow
Soil depth	76–178 cm
Surface fragment cover <=3"	5–10%
Surface fragment cover >3"	5–30%
Available water capacity (0-101.6cm)	15.54–17.75 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
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)	0–30%

Ecological dynamics

The historic climax plant community (HCPC) for a site in North America is the plant community that existed at the time of European immigration and settlement. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site. The historic climax plant community was in dynamic equilibrium with its environment. It is the plant community that was able to avoid displacement by the suite of disturbances and disturbance patterns (magnitude and frequency) that naturally occurred within the area occupied by the site. Natural disturbances, such as drought, fire, grazing by native fauna, and insects, were inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the site that contribute to that dynamic equilibrium. Fluctuations in plant community structure and function caused by the effects of these natural disturbances establish the boundaries of dynamic equilibrium. They are accounted for as part of the range of characteristics for an ecological site. Some sites may have a small range of variation, while others have a large range.

The historic climax plant community of 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 HCPC for

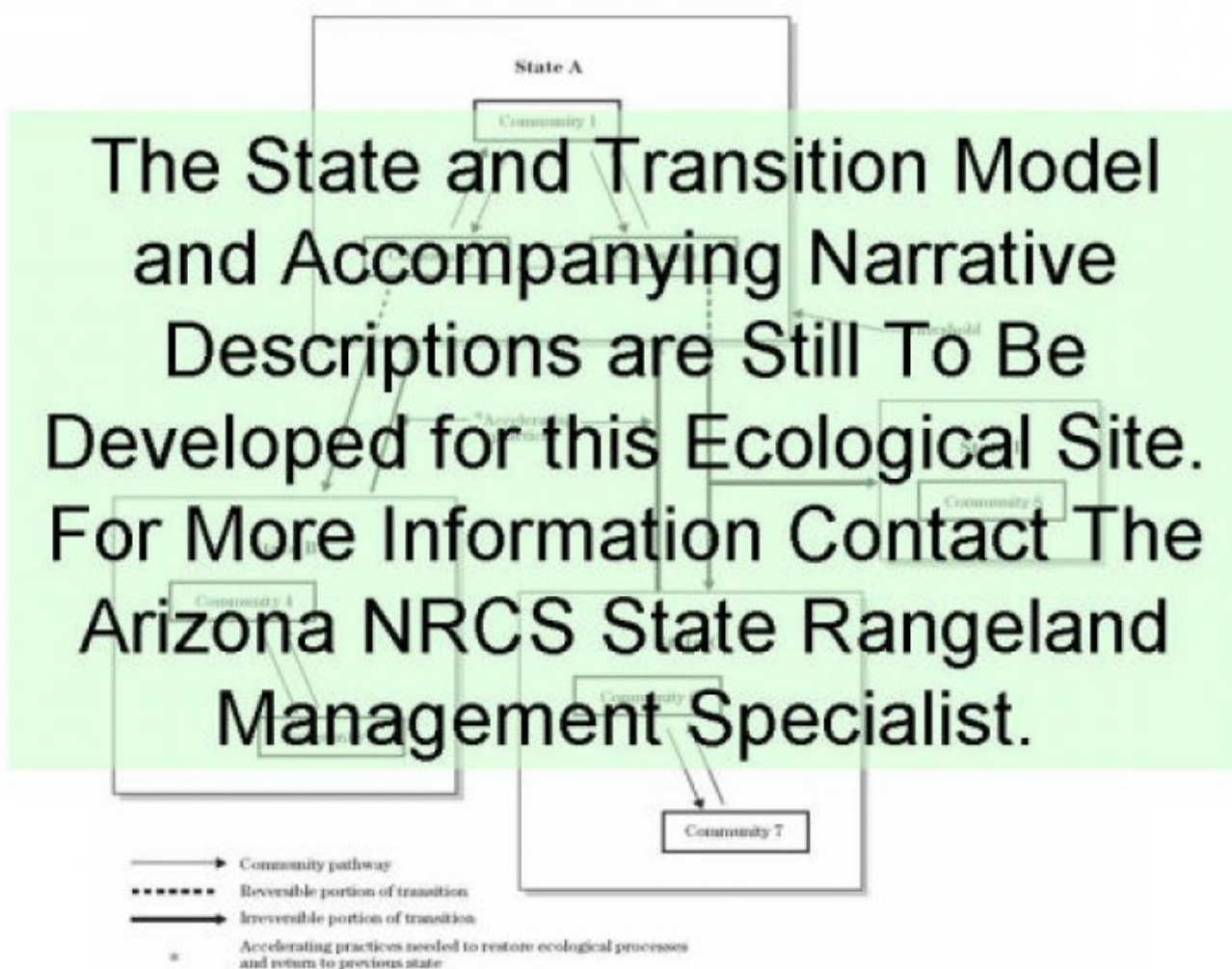
this ecological site has been estimated by sampling relict or relatively undisturbed sites and/or reviewing historic records.

Plant communities that are subjected to abnormal disturbances and physical site deterioration or that are protected from natural influences, such as fire and grazing, for long periods seldom typify the historic climax plant community. The physical site deterioration caused by the abnormal disturbance results in the crossing of a threshold or irreversible boundary to another state, or equilibrium, for the ecological site. There may be multiple thresholds and states possible for an ecological site, determined by the type and or severity of abnormal disturbance. The known states and transition pathways for this ecological site are described in the accompanying state and transition model. The Plant Community Plant Species Composition table provides a list of species and each species or group of species' annual production in pounds per acre (air-dry weight) expected in a normal rainfall year. Low and high production yields represent the modal range of variability for that species or group of species across the extent of the ecological site.

The Annual Production by Plant Type table provides the median air-dry production and the fluctuations to be expected during favorable, normal, and unfavorable years.

The present plant community on an ecological site can be compared to the various common vegetation states that can exist on the site. The degree of similarity is expressed through a similarity index. To determine the similarity index, compare the production 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 shown for the group. Divide the resulting total by the total representative value shown in the Annual Production by Plant Type table for the reference plant community. Variations in production due to above or below normal rainfall, incomplete growing season or utilization must be corrected before comparing it to the site description. The Worksheet for Determining Similarity Index is useful in making these corrections. The accompanying growth curve can be used as a guide for estimating percent of growth completed.

State and transition model



**State 1
Historic Climax Plant Community**

**Community 1.1
Historic Climax Plant Community**



Figure 4. Clayey Upland 14 to 18" p.z. HCPC



Figure 5. Clayey Upland 14 to 18" p.z. AZ Highway 60 about 3

This site has a plant community made up primarily of rhizomatous cool season grasses, warm season sod and bunch grasses, cool season bunch grasses, annual and perennial forbs and a small percentage of shrubs and trees. Plant species that may invade or increase when this site deteriorates are broom snakeweed, wooly groundsel, cacti and exotic annual grasses and forbs. Without periodic natural fire, trees will also increase in the plant community.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	823	785	919
Shrub/Vine	59	126	224
Tree	59	68	90
Forb	11	30	56
Total	952	1009	1289

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	1-2%

Grass/grasslike foliar cover	45-63%
Forb foliar cover	10-13%
Non-vascular plants	0%
Biological crusts	0%
Litter	74-84%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	6-15%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	0-1%
Grass/grasslike basal cover	3-4%
Forb basal cover	0-1%
Non-vascular plants	0%
Biological crusts	0%
Litter	74-84%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	6-15%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-1%	33-37%	1-3%
>0.15 <= 0.3	–	0-1%	30-40%	1-3%
>0.3 <= 0.6	–	–	–	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). AZ3921, 35.7 14-18" p.z. all sites. Growth begins in the spring and continues through the summer..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	14	21	17	18	14	8	3	0	0

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
0	Grasses			706–807	
1				101–202	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	101–202	–
2				252–404	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	252–404	–
3				50–101	
	muttongrass	POFE	<i>Poa fendleriana</i>	50–101	–
4				10–50	
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	10–50	–
5				10–50	
	spike muhly	MUWR	<i>Muhlenbergia wrightii</i>	10–50	–
6				202–303	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	202–303	–
7				50–101	
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	50–101	–
8				101–202	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	101–202	–
9				50–151	
	vine mesquite	PAOB	<i>Panicum obtusum</i>	50–151	–
10				10–50	
	ring muhly	MUTO2	<i>Muhlenbergia torreyi</i>	10–50	–
	tumblegrass	SCPA	<i>Schedonnardus paniculatus</i>	10–50	–
Forb					
11	Annual and Perennial Forbs			10–50	
12				10–50	
	Forb, annual	2FA	<i>Forb, annual</i>	0–50	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–50	–
	aster	ASTER	<i>Aster</i>	0–50	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–50	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–50	–
Shrub/Vine					
13	Shrubs, Half-Shrubs, Cacti, Agave-likes			50–202	
14				10–50	
	rabbitbrush	CHRYS9	<i>Chrysothamnus</i>	10–50	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	10–50	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	10–50	–
15				10–50	
	Fremont's mahonia	MAFR3	<i>Mahonia fremontii</i>	10–50	–
	woolly groundsel	PACA15	<i>Packera cana</i>	10–50	–

16				10–50	
	pricklypear	OPUNT	<i>Opuntia</i>	10–50	–
	yucca	YUCCA	<i>Yucca</i>	10–50	–
Tree					
17	Trees			50–101	
18				50–101	
	juniper	JUNIP	<i>Juniperus</i>	50–101	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0–50	–

Animal community

This site is suitable for grazing during spring, summer and fall. Snow depth limits winter use. Planned grazing systems can benefit this site by allowing rest periods for cool season species. When deteriorated, this site responds relatively slowly to good management practices. When unprotected by vegetation, wind erosion is severe and the soils are difficult to revegetate. Deep cracks develop in the soils when dry. This increases the tendency of the soil to erode. Management systems should maintain adequate ground cover.

This site has relatively poor diversity. As the condition retrograsses, native forbs and cool season grasses decrease and woody plants increase. Brush management practices on the site should maximize edge effect and escape corridors. Particular attention should also be given to cover at or near free water.

Recreational uses

This site occurs as undulating to rolling old basalt flows and is characterized by evergreen trees with a shrub-grass understory. It has cold winters and warm summers with high winds in winter and spring. Activities include hunting, wildlife observation, hiking and backpacking.

Other information

T&E Species: golden and bald eagles may use this area for feeding.

Type locality

Location 1: Navajo County, AZ	
General legal description	Forest Service enclosure, Showlow, Arizona.
Location 2: Apache County, AZ	
General legal description	Arizona Highway 60 right-of-way, 6 miles east of milepost 360, between Showlow and Springerville.
Location 3: Apache County, AZ	
Township/Range/Section	T10 N. R25 E. S10
UTM zone	N
UTM northing	0619554
UTM easting	3793069
General legal description	Location of Range Health Worksheet reference area: Arizona Highway 60 right-of-way, approximately 3/4 mile west of Vernon Rd. turnoff on north side of highway. Map unit SRB in Central Apache County Area SSA.

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)	Steve Cassady, Karlynn Huling
Contact for lead author	Steve Cassady, Flagstaff ESD Office
Date	08/15/2010
Approved by	Steve Cassady
Approval date	
Composition (Indicators 10 and 12) based on	Foliar Cover

Indicators

- 1. Number and extent of rills:** Generally none. A few rills may form on the steeper slopes due to the slow permeability, medium runoff characteristics, and low natural soil surface structure of the soils.

- 2. Presence of water flow patterns:** Generally none, but water flow patterns may occur on the steeper slopes.

- 3. Number and height of erosional pedestals or terracettes:** Generally none. A few very short pedestals or terracettes may form on the steeper slopes.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect 5 to 15 percent, or less, bare ground.

- 5. Number of gullies and erosion associated with gullies:** None.

- 6. Extent of wind scoured, blowouts and/or depositional areas:** None.

- 7. Amount of litter movement (describe size and distance expected to travel):** Generally none. Herbaceous and fine woody litter will be transported in naturally occurring water flow pathways found on steeper slopes. Coarse woody litter will remain in place.

- 8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface texture is mostly clay, with a few areas of silty clay and silty clay loam. Most surface horizons are

cobbly, with some that are stony. Many areas have a surface cover of cobbles and stones that protect the surface from erosion. Most of the soils correlated to this site have shrink/swell clays, so there are many large cracks on the surface when the soil is dry. Cracking will reduce aggregate stability. When well vegetated and protected by surface rock armor, these soils have a moderate resistance to water erosion and a high resistance to wind erosion. Expect the average soil stability value to be 1.5 to 1.7, value under canopy (generally grass) to be 1.1 to 1.4, value in interspaces to be 1.7 to 2.0.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface layer is dark brown (7.5 YR 3/2) (may vary due to parent material), clay (occasionally silty clay or silty clay loam) with strong very fine granular structure about 4 inches thick.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** By line-point intercept transect expect a canopy of cool season grasses of 43 to 61 percent, warm season grasses 0 to 2 percent, annual forbs 9 to 11 percent, half shrubs 0 to 1 percent, and shrubs 0 to 1 percent. Expect basal cover of grass to be 3 to 4 percent and forbs 0 to 1 percent. The average fetch is 1 to 1.25 inches with a maximum fetch of 4 inches. Both canopy and basal cover values (especially canopy cover) naturally decrease due to grazing and/or during a prolonged drought.
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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):** No compaction layer expected. A very hard, massive structure layer of clay beginning at about 4 inches occurs naturally in the soil profile.
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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: By line-point intercept expect cool season rhizomatous grasses >>> annual forbs > warm season bunch grasses = warm season rhizomatous grasses = cool season bunch grasses = perennial forbs = half shrubs = shrubs.
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** In ungrazed situations expect 5 to 10 percent occurrence of decadent material on a line point intercept transect. In grazed areas this should be < 5 percent. Expect some mortality on short-lived grasses, forbs and half shrubs during and shortly after short term drought periods. Expect higher mortality on these plants and some mortality on longer lived bunch grasses, perennial forbs and shrubs and reduced basal cover of rhizomatous grasses during prolonged, severe drought.
-
14. **Average percent litter cover (%) and depth (in):** Mostly herbaceous litter with minor amount of woody litter. Litter amounts increase during the first few years of drought, then decrease in later years.
-

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 850 to 875 pounds per acre (dry weight) in a drought year, 875 to 1025 pounds per acre in a median year, 1025 to 1150 pounds per acre in a wet year.
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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:** Broom snakeweed and cacti are native to the site, but they have the ability to increase and dominate the area after severe disturbance. Juniper and Colorado pinyon also naturally occur on the site in minor amounts, but have the ability to increase and dominate the site without periodic fire on the site.
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17. **Perennial plant reproductive capability:** All plants native to this site are adapted to the climate and are capable of producing seeds, stolons, and rhizomes in all years except during but the most severe droughts.
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