

Ecological site R035XB255AZ Sandstone Rockland 6-10" 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.

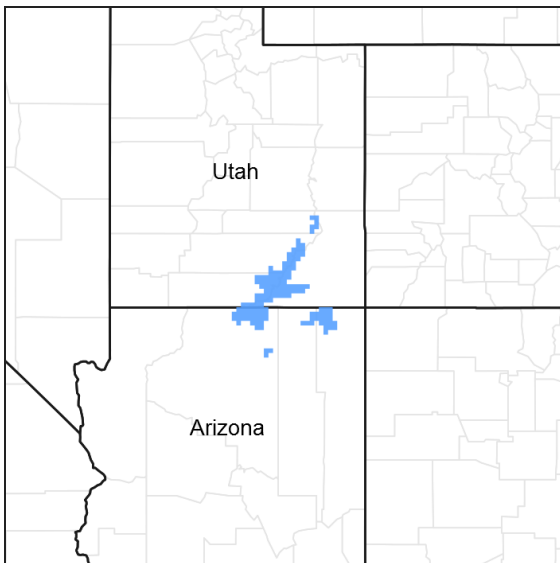


Figure 1. Mapped extent

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

This ecological site occurs in Common Resource Area 35.2 - the Colorado Plateau Shrub – Grasslands

Elevations range from 3800-5800 feet and precipitation averages 6 to 10 inches per year. Vegetation includes shadscale, fourwing saltbush, Mormon tea, blackbrush, Indian ricegrass, galleta, blue grama, and black grama. The soil temperature regime is mesic and the soil moisture regime is typic aridic. 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

R035XB206AZ	Sandy Upland 6-10" p.z. Warm Deep sandy sites that are calcareous and occur on uplands
R035XB230AZ	Sandstone Upland 6-10" p.z. Very Shallow, Warm Similar site that is predominantly soil covered, instead of predominantly bedrock outcrop. Very shallow soils formed in residuum and eolian deposits

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Coleogyne ramosissima</i> (2) <i>Purshia stansburiana</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i> (2) <i>Bouteloua eriopoda</i>

Physiographic features

This site occurs on extensive relatively flat sandstone bedrock areas with widely scattered vegetation in shallow depressions and fractures in the bedrock. Slopes are generally less than 15 percent, but there can be steeper spots within the site.

This site occurs on summits and ledges of mesas, structural benches, dipslopes, cuestas and plateaus. It does not benefit from run-in moisture from adjacent areas and occurs on all exposures.

Table 2. Representative physiographic features

Landforms	(1) Structural bench (2) Mesa (3) Cuesta
Flooding frequency	None
Ponding frequency	None
Elevation	1,158–1,768 m
Slope	0–15%
Aspect	Aspect is not a significant factor

Climatic features

The 35.2 Colorado Plateau Cold Desert Shrub - Grassland common resource area has a very dry and windy climate that is hot in the summer and cold in the winter. The annual precipitation averages between 6 and 10 inches. The soil moisture regime is typic aridic and the soil temperature regime is mesic. A slight majority of the precipitation arrives during the late fall, winter, and early spring. This winter season moisture originates in the Pacific Ocean and arrives as rain, or sometimes snow, during widespread frontal storms of generally low intensity. The majority of the snow (average range of 1 to 17 inches) falls from December through February, but rarely lasts more than a few days. A seasonal drought occurs from late May through early July. Summer rains occur from July through September during brief intense local thunderstorms. The rain is sporadic in intensity and location. The moisture originates from the Gulf of Mexico in the early summer and the Gulf of California in the late summer/early fall. Windy conditions are common year round, but the winds are strongest and most frequent during the spring.

Table 3. Representative climatic features

Frost-free period (average)	181 days
Freeze-free period (average)	207 days
Precipitation total (average)	254 mm

Influencing water features

This site is mostly bedrock. Most of the precipitation falling on this site runs off the site and contributes moisture to other ecological sites. Some of the moisture is captured in depressions and cracks in the bedrocks where there is sufficient soil to support vegetation.

Soil features

Soils on this site are very shallow with little or no distinguishing soil development characteristics. Surface textures are sands to loamy sands with sandy subsurface textures. The soils are deposited and stabilized in shallow depression and/or in fractures of undulating exposed bedrock on sandstone.

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

SSA-711 Navajo Mountain Area 44, 45, 52-Rock outcrop

SSA-UT689 Glen Canyon Area 17-Needle;

Table 4. Representative soil features

Parent material	(1) Eolian sands–calcareous sandstone (2) Alluvium–sandstone
Surface texture	(1) Sand (2) Fine sand (3) Loamy sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderate to rapid
Soil depth	0–25 cm
Surface fragment cover ≤3"	0–15%
Surface fragment cover >3"	0–60%
Available water capacity (0-101.6cm)	0–2.29 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4

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

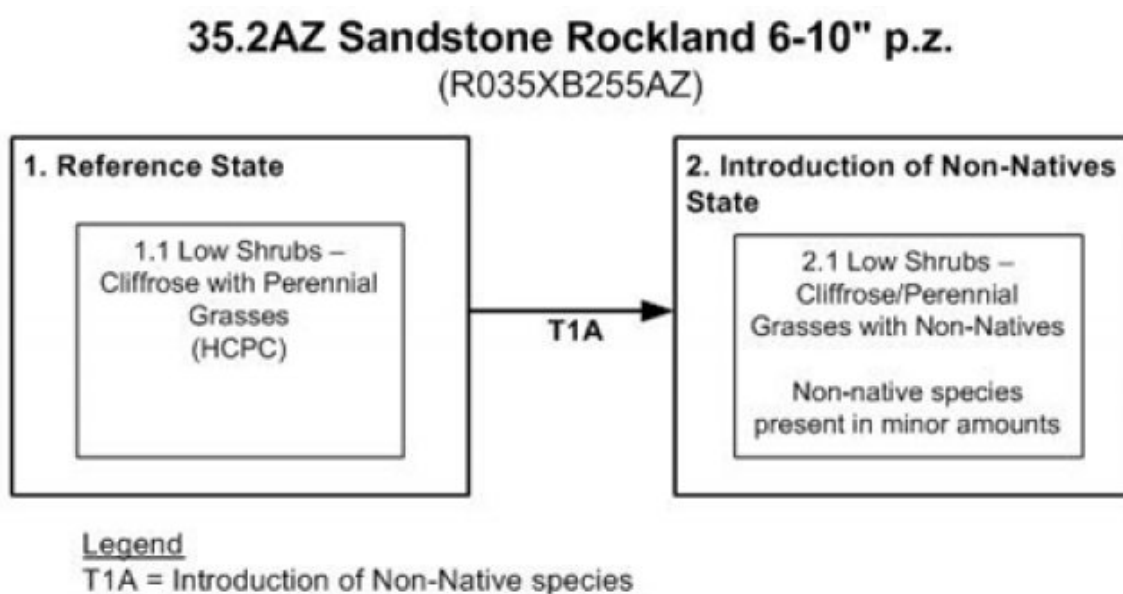


Figure 4. State and Transition Model - R035XB255AZ

State 1 Reference State

This state has a variety of vegetation due to extra run-on moisture from adjacent rock outcrops, differences in aspect, temperature, and availability of seed sources. This site receives extra moisture in the form of runoff from the surrounding rock outcrop. This extra moisture results in variety of shrub and herbaceous species, and in some locations an occasional small tree. Plants commonly found on this site are blackbrush, Stanbury cliffrose, Bigelow sagebrush, Utah serviceberry, Indian ricegrass, black grama and galleta. Sites with very shallow soils and depressions of deeper soils will be dominated by grasses, forbs and low growing shrubs with widely scattered large shrubs. On sites where deep fractures in the sandstone rock outcrop occur along with shallow soil depositions will have a mix of shrubs, grasses and forbs. These sites will also have scattered large shrubs and small trees where available moisture and deep fractures exist. These sites are relatively stable due to lack of fire and low potential from invasion of non-native species.

Community 1.1

Low Shrub-Cliffrose and Perennial Grasses (HCPC)



Figure 5. Sandstone Rockland 6-10" p.z.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	50	78	95
Grass/Grasslike	22	39	62
Forb	2	6	13
Tree	–	6	11
Total	74	129	181

Table 6. Soil surface cover

Tree basal cover	0-2%
Shrub/vine/liana basal cover	0-4%
Grass/grasslike basal cover	0-2%
Forb basal cover	0-2%
Non-vascular plants	0-5%
Biological crusts	0-5%
Litter	0-10%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	50-90%
Water	0%
Bare ground	5-25%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	0-3%	0-3%	0-3%
>0.15 <= 0.3	–	0-3%	0-3%	0-1%
>0.3 <= 0.6	–	0-3%	0-2%	0-1%
>0.6 <= 1.4	–	0-2%	–	–
>1.4 <= 4	0-1%	0-1%	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2

Introduction of Non-Native State

This state has a variety of vegetation due to extra run-on moisture from adjacent rock outcrops, differences in aspect, temperature, and availability of seed sources. This site receives extra moisture in the form of runoff from the surrounding rock outcrop. This extra moisture results in variety of shrub and herbaceous species, and in some locations an occasional small tree. Plants commonly found on this site are blackbrush, Stanbury cliffrose, Bigelow sagebrush, Utah serviceberry, Indian ricegrass, black grama and galleta. Sites with very shallow soils and depressions of deeper soils will be dominated by grasses, forbs and low growing shrubs with widely scattered large shrubs. On sites where deep fractures in the sandstone rock outcrop occur along with shallow soil depositions will have a mix of shrubs, grasses and forbs. These sites will also have scattered large shrubs and small trees where available moisture and deep fractures exist. These sites are relatively stable due to lack of fire. The plant communities in this state will have introduced annuals including cheatgrass, red brome and Russian thistle.

Community 2.1

Low shrubs - Cliffrose/Perennial Grasses with Non-Natives

This community phase is similar to the historic climax plant community, but introduced annual grasses and forbs are present in the plant community and compete with native species.

Transition T1A

State 1 to 2

Introduction of non-native species creates an irreversible change to the plant community.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Dominant Grasses			22–45	
	black grama	BOER4	<i>Bouteloua eriopoda</i>	0–28	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–22	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–17	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	0–17	–
2	Miscellaneous Grasses			0–17	
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	0–11	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–11	–

	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	0-11	-
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0-6	-
	spike dropseed	SPCO4	<i>Sporobolus contractus</i>	0-6	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0-6	-
	saline wildrye	LESAS	<i>Leymus salinus ssp. salinus</i>	0-2	-
	muttongrass	POFE	<i>Poa fendleriana</i>	0-2	-
	Grass, annual	2GA	<i>Grass, annual</i>	0-2	-
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-2	-
Forb					
3	Forbs			1-11	
	globemallow	SPHAE	<i>Sphaeralcea</i>	0-6	-
	Wright's bird's beak	COWR2	<i>Cordylanthus wrightii</i>	0-6	-
	gilia	GILIA	<i>Gilia</i>	0-3	-
	winged buckwheat	ERAL4	<i>Eriogonum alatum</i>	0-2	-
	desert trumpet	ERIN4	<i>Eriogonum inflatum</i>	0-2	-
	flatspine stickseed	LAOC3	<i>Lappula occidentalis</i>	0-2	-
	Jones' pepperweed	LEMOJ	<i>Lepidium montanum var. jonesii</i>	0-2	-
	cryptantha	CRYPT	<i>Cryptantha</i>	0-2	-
	tansymustard	DESCU	<i>Descurainia</i>	0-2	-
	mustard	BRASS2	<i>Brassica</i>	0-2	-
	Indian paintbrush	CAST12	<i>Castilleja</i>	0-2	-
	thrift mock goldenweed	STARA	<i>Stenotus armerioides var. armerioides</i>	0-2	-
	longbeak streptanthella	STLO4	<i>Streptanthella longirostris</i>	0-2	-
	Townsend daisy	TOWNS	<i>Townsendia</i>	0-2	-
	rock goldenrod	PEPUP	<i>Petradoria pumila ssp. pumila</i>	0-2	-
	cleftleaf wildheliotrope	PHCRC	<i>Phacelia crenulata var. corrugata</i>	0-2	-
	phlox	PHLOX	<i>Phlox</i>	0-2	-
	fineleaf hymenopappus	HYFI	<i>Hymenopappus filifolius</i>	0-2	-
	dock	RUMEX	<i>Rumex</i>	0-2	-
	ragwort	SENEC	<i>Senecio</i>	0-2	-
	ipomopsis	IPOMO2	<i>Ipomopsis</i>	0-1	-
	Newberry's twinpod	PHNE5	<i>Physaria newberryi</i>	0-1	-
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0-1	-
	whitemargin sandmat	CHAL11	<i>Chamaesyce albomarginata</i>	0-1	-
	Fendler's sandmat	CHFE3	<i>Chamaesyce fendleri</i>	0-1	-
	Parry's sandmat	CHPA28	<i>Chamaesyce parryi</i>	0-1	-
	wedgeleaf draba	DRCU	<i>Draba cuneifolia</i>	0-1	-
	larkspur	DELPH	<i>Delphinium</i>	0-1	-
	bristle flax	LIAR3	<i>Linum aristatum</i>	0-1	-
	hoary tansyaster	MACA2	<i>Machaeranthera canescens</i>	0-1	-
	Colorado four o'clock	MIMU	<i>Mirabilis multiflora</i>	0-1	-
	beardtongue	PENST	<i>Penstemon</i>	0-1	-
	Wetherill's buckwheat	ERWE	<i>Eriogonum wetherillii</i>	0-1	-

	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–1	–
	prickly sandwort	ARAC2	<i>Arenaria aculeata</i>	0–1	–
Shrub/Vine					
4	Dominant Shrubs			45–67	
	blackbrush	CORA	<i>Coleogyne ramosissima</i>	0–56	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	0–34	–
	Bigelow sage	ARBI3	<i>Artemisia bigelovii</i>	0–22	–
5	Miscellaneous Shrubs			0–22	
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–11	–
	Greene's rabbitbrush	CHGR6	<i>Chrysothamnus greenei</i>	0–11	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	0–11	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0–11	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–11	–
	roundleaf buffaloberry	SHRO	<i>Shepherdia rotundifolia</i>	0–6	–
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0–6	–
	Navajo yucca	YUBA2	<i>Yucca baileyi</i>	0–6	–
	Sonoran scrub oak	QUTU2	<i>Quercus turbinella</i>	0–6	–
	sand sagebrush	ARFI2	<i>Artemisia filifolia</i>	0–6	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–6	–
	Cutler's jointfir	EPCU	<i>Ephedra cutleri</i>	0–6	–
	Torrey's jointfir	EPTO	<i>Ephedra torreyana</i>	0–6	–
	crispleaf buckwheat	ERCO14	<i>Eriogonum corymbosum</i>	0–6	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–6	–
	singleleaf ash	FRAN2	<i>Fraxinus anomala</i>	0–6	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–2	–
	brickellbush	BRICK	<i>Brickellia</i>	0–2	–
	littleleaf mountain mahogany	CEIN7	<i>Cercocarpus intricatus</i>	0–2	–
	alderleaf mountain mahogany	CEMO2	<i>Cercocarpus montanus</i>	0–2	–
Tree					
6	Trees			0–11	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	0–7	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	0–4	–

Animal community

This site is suitable for grazing during any period of the year by cows and calves, stocker cattle, sheep and horses. Prescribed grazing systems can benefit this site by allowing rest periods for the cool season species.

The potential plant community provides a variety of food and cover plants for wildlife. When the vegetation complex retrogresses then unpalatable shrub species increase and the site becomes less usable as a foraging area for some species. Grazing practices that encourage cool season grass species are beneficial to antelope, cottontails, and rodents. Shrubs that provide both food and cover should be maintained.

Recreational uses

Site is located on gently rolling benches and plateaus which lend themselves to activities such as horseback riding, wildlife observation, photography, and hunting.

This site has a variety of spring and summer flowers which are particularly noticeable after good moisture periods. It has good aesthetic appeal when not severely disturbed.

Winters are cold, however, relatively mild spring, fall and summer months are attractive to recreationists.

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)	Kenneth Gishi
Contact for lead author	State Rangeland Management Specialist, NRCS-Arizona State Office
Date	07/30/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None expected, a few, short (less than 3 feet) can form on steeper slopes. There may a slight increase of rills following intense storm events.
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2. **Presence of water flow patterns:** Very rare due to high amount of rock and bare ground cover.
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3. **Number and height of erosional pedestals or terracettes:** Rare. However, in areas of sufficient plant cover small pedestals of 1 inch are expected around long-lived shrubs.
-

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground can range from 5 – 25 percent. Do not count intact biological crust as bare ground.

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5. **Number of gullies and erosion associated with gullies:** None expected.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** Uncommon, but some active deposition around long-lived shrubs is normal.
-
7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is fairly common, especially fines litter (<1/8" in diameter). Fine litter can move up to 3 feet across the site. Litter will accumulate around plant bases, soil depressions or rock obstructions.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The site is expected to have an average stability rating of 2-3.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface horizon depth will range from 2-4 inches with a single grain; loose structure. Surface textures will range from sand to loamy sand with color depending on parent material. Use specific soil survey information for supplemental information to this indicator.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Site is dominated by a shrub canopy with a lower canopy of perennial grasses and forbs, followed by annuals. Shrubs and perennial grasses provide site protection by capturing and slowing runoff to promote infiltration.
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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):** None, soils are normally very shallow to bedrock.
-
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: Low Shrubs > Perennial Grasses > Large Shrubs
- Sub-dominant: Perennial Forbs > Annuals > Biological Soil Crust
- Other: Small Trees
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** All plant functional groups are adapted to survival in all but the most severe droughts. Severe winter droughts affect the shrubs the most. Severe summer droughts affect grasses the most.
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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):** 75 – 125 lbs/ac expected in a normal year.

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:** Plants native to site, but that can and do increase on the site include broom snakeweed, Fendler's threeawn and Greene rabbitbrush. Non-natives that can invade the site with or without disturbance include cheatgrass, red brome and prickly Russian thistle.

17. **Perennial plant reproductive capability:** All plants native to the site are adapted to the climate and are capable of producing seeds, stolons, and/or rhizomes except during the most severe droughts.
