

## Ecological site R035XH813AZ Silty Upland 17-25" 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 35.8 - 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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Quercus gambelii</i> (2) <i>Prunus virginiana</i>

Herbaceous	(1) <i>Poa fendleriana</i> (2) <i>Pascopyrum smithii</i>
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## Physiographic features

This ecological site occurs on level to nearly level plateaus, toeslopes and broad open valleys in forests. Soils are very deep. Surface textures range from silt to silt loam. Slopes range from 0 to 15 percent.

**Table 2. Representative physiographic features**

Landforms	(1) Mountain (2) Mountain valley
Flooding frequency	None
Ponding frequency	None
Elevation	6,800–8,500 ft
Slope	0–15%
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)	25 in

## Influencing water features

### Soil features

The soils on this ecological site are very deep. Surface textures range from silt to silt loam. Subsurface texture is loam, stony sandy clay loam, and very gravelly fine sandy loam. Parent material is alluvium and eolian material derived from sandstone, siltstone and quartz. Soil formation is residuum and alluvium materials from sandstone and diorite. Water erosion hazard is severe; wind erosion hazard is slight. Soils are non-saline and non-sodic. pH range is 6.1-7.3. Soil temperature regime is mesic; moisture regime is typic ustic.

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

SSA-713 Chinle Area MU's 20 Jacks & Jacks family;

SSA-715 Fort Defiance Area MU 125 Millpaw;

SSA-717 Shiprock Area AZ/NM MU 618 Bigpaw.

**Table 4. Representative soil features**

Parent material	(1) Alluvium–sandstone and siltstone (2) Residuuum–diorite
Surface texture	(1) Silt (2) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate
Soil depth	40–60 in
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	7–10 in
Soil reaction (1:1 water) (0-40in)	6.1–7.3

## 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.

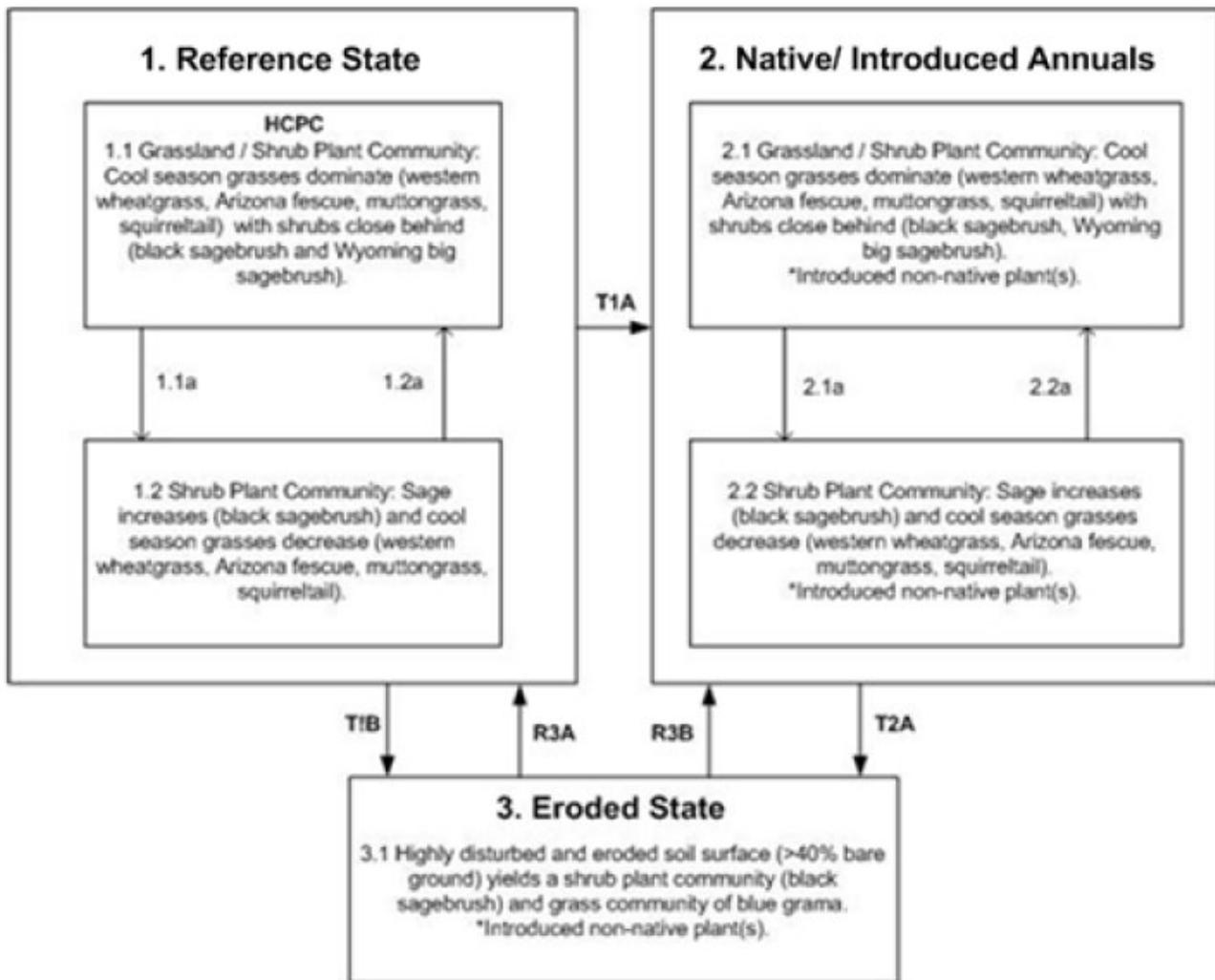
Deterioration of the plant community, hydrology, or soil site stability on an ecological site can result in crossing a threshold or potentially irreversible boundary to another state, or equilibrium. This can occur as a result of the loss of soil surface through erosion, the loss of the stability of 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

## 35.8 Silty Upland 17-25" p.z.



**T1A** – There is an introduction of non-native plants. (Ex. Cheatgrass)

**T1B & T2A** – Severe disturbance (mechanical) or continuous heavy grazing that crosses a threshold and allows surface erosion to become evident.

**R3A & R3B** – If a return is possible it would be a long term solution with possible intensive management (brush management, range seeding, grazing management) in conjunction with favorable climatic conditions

1.1a & 2.1a – Persistent disturbance (drought, grazing) that reduces grass cover and allows shrubs to increase.

1.2a & 2.2a – Management practices (grazing management, brush management) that promote increased cool season grass production.

Figure 4. STM

### State 1 Reference State

This is a cool season grass and shrub community. It occurs in the mountains from 7300' to 9400' in elevation. The cool season grasses that are most prevalent are western wheatgrass, Arizona fescue, muttongrass and squirreltail. Black sagebrush and Wyoming sagebrush are the dominant shrub component. A variety of forbs are present on the site but they account for a small percentage of the plant community. Ongoing disturbance has changed much of this site to a black sagebrush dominated dominated plant community.

### Community 1.1 Historic Climax Plant Community



**Figure 5. Relict area of the HCPC plant community**

Site is a grass-shrub plant community. There are various areas with an occasional Gambel oak, common chokecherry or ponderosa pine. In addition, Utah serviceberry and mountain snowberry may be present. Black sagebrush is the major shrub. Grasses include muttongrass, western wheatgrass, Arizona fescue and bottlebrush squirreltail. With severe disturbance, black sagebrush and trailing fleabane will increase; cheatgrass and annual forbs will invade.

**Table 5. Annual production by plant type**

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	360	510	660
Shrub/Vine	250	335	420
Forb	20	70	120
Tree	10	25	60
<b>Total</b>	<b>640</b>	<b>940</b>	<b>1260</b>

**Table 6. Ground cover**

Tree foliar cover	5-10%
Shrub/vine/liana foliar cover	5-30%
Grass/grasslike foliar cover	5-10%
Forb foliar cover	0-2%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

**Table 7. Canopy structure (% cover)**

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	0-5%	–
>0.5 <= 1	–	5-10%	–	0-2%
>1 <= 2	–	10-30%	5-10%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	5-10%	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). AZ3581, 35.8 17-25" p.z. all sites. Growth begins in the spring, most growth occurs during the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	4	10	24	21	23	13	5	0	0

Figure 8. Plant community growth curve (percent production by month). AZ3902, 35.8 17-25" p.z. Arizona fescue. Growth begins in the late spring and extends through the summer rainy season..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	5	20	30	30	10	5	0	0

Figure 9. Plant community growth curve (percent production by month). AZ3903, 35.8 17-25" p.z. western wheatgrass. Growth begins in the spring, most growth occurs in the summer. Seed set occurs in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	10	15	25	30	10	5	0	0

Figure 10. Plant community growth curve (percent production by month). AZ3904, 35.8 17-25" p.z. black sagebrush. Most growth occurs in the spring. Stem elongation and seed set occur in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	15	30	10	10	20	10	0	0

## Community 1.2 Shrub Plant Community

This plant community has an increase of shrubs with a decline in perennial grasses. Black sagebrush increase with disturbance and can dominate with frequent surface disturbance.

### Pathway 1.1a Community 1.1 to 1.2

Drought, extended periods of winter dominated moisture patterns, unmanaged grazing, and reduction in the natural fire frequency will reduce the perennial grass component of the plant community and allow the woody species to increase on the site.

### Pathway 1.2a Community 1.2 to 1.1

Extended periods of normal precipitation patterns, well managed grazing, and a return to the normal fire regime will allow the perennial grasses to increase on the site.

### Conservation practices

Prescribed Burning
Prescribed Grazing

## State 2

### Native/ Introduced Annuals

The general aspect of this state is a grassland/shrubland community. There is a dominance of cool season grasses with a mix of shrubs. This state has loss of biotic function and integrity with an increase of black sagebrush with introduced annual grasses and forbs.

### Community 2.1

#### Grassland Shrub with Introduced Annuals

This plant community is dominated by cool season grasses including wester wheatgrass, Arizona fescue, muttongrass and bottlebrush squirreltail. Shrubs include black sagebrush and Wyoming big sagebrush. Introduced annuals include cheatgrass and Russian thistle.

### Community 2.2

#### Shrub Community with Introduced Annuals

This community is dominated by black sagebrush and Wyoming big sagebrush. There is a minor understory of perennial cool season grasses including western wheatgrass and Arizona fescue. Introduced annuals include cheatgrass and Russian thistle.

### Pathway 2.1a

#### Community 2.1 to 2.2

Drought, extended periods of winter dominated moisture patterns, unmanaged grazing, and reduction in the natural fire frequency will reduce the perennial grass component of the plant community and allow the woody species to increase on the site.

## State 3

### Eroded State

The general aspect of this state is shrub dominated plant community with a eroded surface. The hydrological function and biotic functions are severely degraded. Surface disturbance has cause an increase in black sagebrush and loss of perennial grass cover. The site has an increase of rills and gullies.

### Community 3.1

#### Black Sage - Blue Grama - Introduced Annuals

This plant community is dominated by black sagebrush, with an understory dominated by blue grama and native and introduced annuals. Introduced annuals include cheatgrass and Russian thistle.

### Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	Grasses			360–660	

	muttongrass	POFE	<i>Poa fendleriana</i>	175–250	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	50–200	–
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	60–120	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	60–120	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–60	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–30	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–30	–
<b>Forb</b>					
2	<b>Forbs</b>			20–120	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	30–60	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	30–60	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	6–30	–
	trailing fleabane	ERFL	<i>Erigeron flagellaris</i>	5–30	–
	ragwort	SENEC	<i>Senecio</i>	5–20	–
	pingue rubberweed	HYRI	<i>Hymenoxys richardsonii</i>	0–15	–
	hoary tansyaster	MACA2	<i>Machaeranthera canescens</i>	0–5	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–5	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0–5	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–5	–
	spreading fleabane	ERDI4	<i>Erigeron divergens</i>	0–5	–
	Mexican woollywhite	HYME	<i>Hymenopappus mexicanus</i>	0–3	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–3	–
	redroot buckwheat	ERRA3	<i>Eriogonum racemosum</i>	0–3	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–3	–
	wild onion	ALAS2	<i>Allium ascalonicum</i>	0–3	–
	pussytoes	ANTEN	<i>Antennaria</i>	0–3	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–3	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–3	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0–3	–
	MacDougal verbena	VEMA	<i>Verbena macdougalii</i>	0–3	–
	purplewhite owl's-clover	ORPU2	<i>Orthocarpus purpureoalbus</i>	0–3	–
	New Mexico groundsel	PANE7	<i>Packera neomexicana</i>	0–3	–
	phlox	PHLOX	<i>Phlox</i>	0–3	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–3	–
<b>Shrub/Vine</b>					
3	<b>Shrubs</b>			250–360	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	150–250	–
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	20–80	–
	mountain snowberry	SYOR2	<i>Symphoricarpos oreophilus</i>	0–35	–
	gooseberry currant	RIMO2	<i>Ribes montigenum</i>	0–25	–
	Utah serviceberry	AMUT	<i>Amelanchier utahensis</i>	0–20	–
	Arizona fescue	FEAR2	<i>Festuca arizonica</i>	0–12	–

	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–12	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–10	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–10	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–5	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	0–5	–
	pincushion cactus	PEDIO	<i>Pediocactus</i>	0–2	–
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0–2	–
<b>Tree</b>					
4	<b>Trees</b>			10–60	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0–60	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	0–60	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	0–60	–
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0–60	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	0–60	–
	Gambel oak	QUGA	<i>Quercus gambelii</i>	0–60	–

## Animal community

Site is favorable for grazing throughout most of the year except when snow cover restricts availability of forage. Planned grazing systems adapt well to use on this site. Wildlife species include mule deer, rodents, lizards, coyote, rabbits and snakes.

## Recreational uses

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

Activities include hunting, cross-country riding, photography, hiking, rock collecting, wildlife observation and chokecherry picking.

## Wood products

Firewood cutting is possible on this site for Oak.

## Type locality

Location 1: Apache County, AZ	
Township/Range/Section	T39N R29E S12
General legal description	Pastora Peak Quad, on top of Carrizo Mountains, Navajo Indian 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

Dan Carroll  
 HSH  
 Larry D. Ellicott  
 Larry D.Ellicott  
 Steve Barker

## 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)	Dan Carroll
Contact for lead author	NRCS State Rangeland Management Specialist, Arizona State Office, Phoenix, AZ
Date	03/19/2012
Approved by	Steve Barker
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Generally, there are no rills present. There may be minor rill formation on steeper slopes (10-15%) if there is bare ground present.

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2. **Presence of water flow patterns:** Water flow patterns are few and scattered. They are short in length and compose only a small percentage of the site.

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3. **Number and height of erosional pedestals or terracettes:** Any pedestals will be along water flow pathways next to perennial plants.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is expected to be 20-35%

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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:** There can be some deposition around long lived perennial shrubs and grasses.

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter is transported by wind and water in open areas and coarse woody litter tends to stay in place.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The soil surface has good plant cover on soils that are loams to clays at the surface. The soils are resistant to wind erosion and with good plant cover are less susceptible to water erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The soil surface structure ranges from 0-5" thick and generally, it is weak to moderate subangular blocky structure. Color for the surface is yellowish or reddish browns.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** This site is characterized by a relatively even distribution of cool season grasses (Arizona fescue, squirreltail, muttongrass, western wheatgrass) and shrubs (black sagebrush).
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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 expected.
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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: Cool season grasses>shrubs
- Sub-dominant: None
- Other: Minor: <10% Forbs
- 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 years, except during the most severe droughts. Severe winter droughts affect shrubs and cool season grasses the most.
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14. **Average percent litter cover (%) and depth ( in):** Litter amounts increase during the early years of long term drought, then decrease in later years.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Approximately 900-1000 pounds per acre in an average 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:** Black sagebrush is native to the site, but has the potential to increase and dominate the site. This is a result of disturbance that diminishes cool season grass cover and as result shrubs increase and warm season grass (blue grama) increase. Cheatgrass is the primary non-native plant that invades this site in small percentages.

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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 most years except during most severe droughts.
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