

# Ecological site R035XB227AZ Sandy Loam Upland 6-10" p.z. Saline-Sodic

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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.

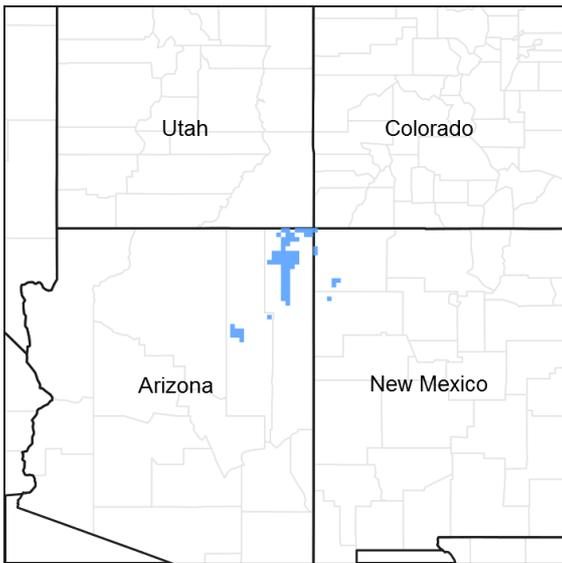


Figure 1. Mapped extent

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.

## Similar sites

R035XB223AZ	<b>Sandy Upland 6-10" p.z. Sodic</b>
R035XB219AZ	<b>Sandy Loam Upland 6-10" p.z.</b>

Table 1. Dominant plant species

Tree	Not specified
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Shrub	Not specified
Herbaceous	(1) <i>Sporobolus airoides</i> (2) <i>Achnatherum hymenoides</i>

## Physiographic features

This site occurs in an upland position on fan remnants of valley sides and summits of structural benches. It neither benefits significantly from run-in of moisture nor does it suffer from excessive loss of moisture from runoff.

**Table 2. Representative physiographic features**

Landforms	(1) Valley side (2) Structural bench (3) Fan remnant
Flooding frequency	Rare to occasional
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	Rare to occasional
Elevation	3,800–5,800 ft
Slope	1–15%
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)	10 in

## Influencing water features

It neither benefits significantly from run-in of moisture nor does it suffer from excessive loss of moisture from runoff.

## Soil features

This site has soils that are moderately deep to very deep, well drained and saline-sodic that formed in reworked eolian material and alluvium derived from sandstone, shale and siltstone.

Surface textures range from sandy loam to fine sandy loam on the surface. Subsurface textures generally range from sandy loams to sandy clay loams.

Typical taxonomic units include:

Chinle Area (AZ713)- Soil Map Unit's - 28 Marcou, 34 Nakai;  
 SSA 715 Fort Defiance (AZ715) - Soil Map Unit's - 5 Bacobi, 19 Brimhall;  
 Shiprock NM (AZ717)- Soil Map Unit's -140 Benally, 505 Recapture, and 523 Tyende.

**Table 4. Representative soil features**

Parent material	(1) Alluvium–sandstone (2) Eolian deposits–shale
Surface texture	(1) Sandy loam (2) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderately slow
Soil depth	20–60 in
Surface fragment cover <=3"	0–10%
Available water capacity (0-40in)	1–3 in
Calcium carbonate equivalent (0-40in)	5–10%
Electrical conductivity (0-40in)	2–16 mmhos/cm
Sodium adsorption ratio (0-40in)	30–60
Soil reaction (1:1 water) (0-40in)	7.4–9.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%

## 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**

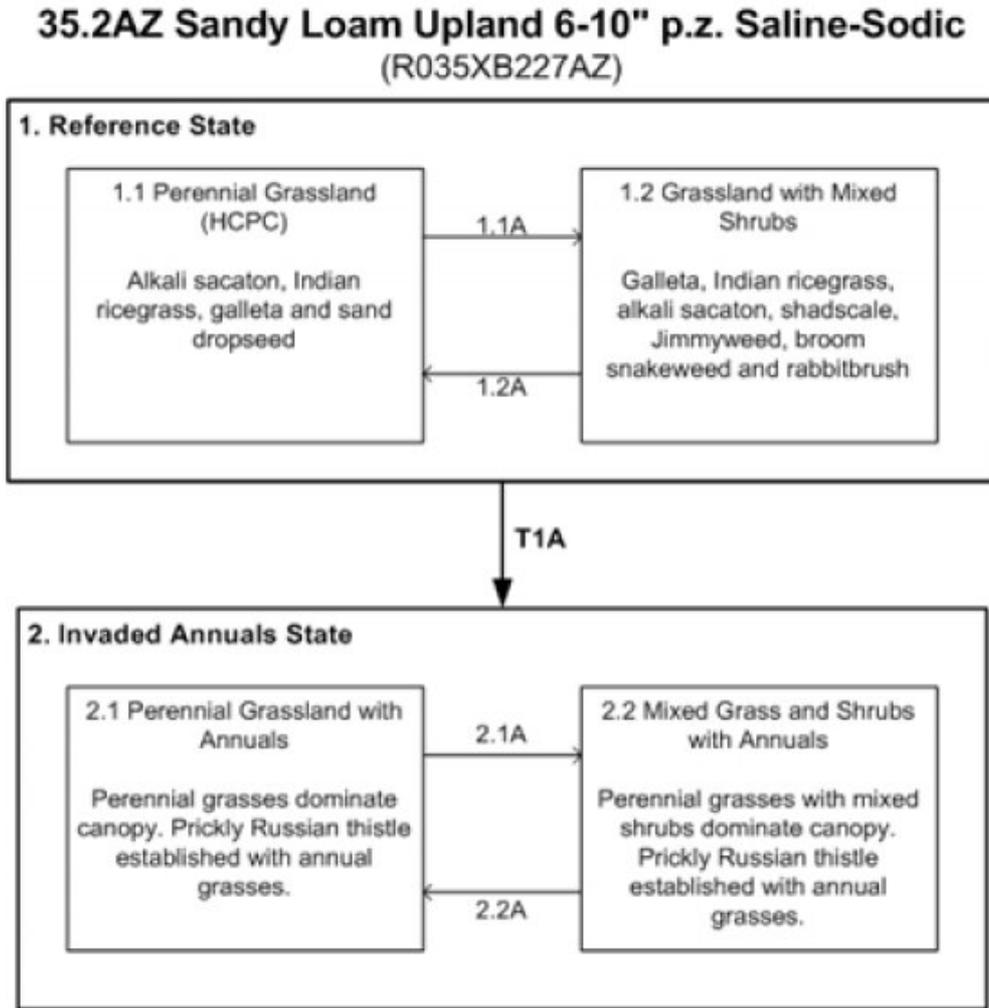


Figure 4. State and Transition Model - R035XB227AZ

**State 1  
Reference State**

This state includes the Historic Climax Plant Community which is a grassland dominated community with some forbs and low growing shrubs. Plant species most likely to invade or increase on this site with disturbance are broom snakeweed, black greasewood, annual forbs, and cheatgrass.

**Community 1.1  
Historic Climax Plant Community**



Figure 5. Sandy Loam Upland 6-10" p.z. Saline-Sodic

This plant community is made up primarily of mid and short warm season grasses and cool season grasses with a relatively small percentage of forbs and some low growing shrubs. Dominant grasses are Alkali sacaton and Indian ricegrass with lesser amounts of galleta and dropseeds.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	280	360	435
Shrub/Vine	45	60	75
Forb	15	25	35
<b>Total</b>	<b>340</b>	<b>445</b>	<b>545</b>

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-5%
Grass/grasslike basal cover	5-20%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	5-35%
Litter	15-30%
Surface fragments >0.25" and <=3"	0-10%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	35-65%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	0-5%	0-15%	0-5%
>0.5 <= 1	–	0-5%	0-20%	0-3%
>1 <= 2	–	–	0-5%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). AZ3509, 35.3 10-14" p.z. shadscale saltbush. Growth begins in spring and extends through the summer. Seed set occurs in summer to early fall..

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

Figure 8. Plant community growth curve (percent production by month). AZ3521, 35.2 6-10" p.z. all sites. Growth begins in the spring and continues through the summer. Most growth in this CRA occurs in the spring using stored winter moisture..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	1	9	20	27	14	10	11	5	3	0	0

Figure 9. Plant community growth curve (percent production by month). AZ5201, 35.2 6-10" p.z. galleta. Growth begins in spring, most growth occurs during summer rains..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	10	20	10	15	35	5	0	0	0

Figure 10. Plant community growth curve (percent production by month). AZ5202, Indian ricegrass, 35.2 6-10" p.z.. Growth begins in spring, most growth occurs in May, goes dormant during summer heat..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	15	40	20	0	0	10	5	0	0

## Community 1.2 Grassland with Mixed Shrubs

This plant community is characterized as a grassland with scattered shrubs. Common grasses are alkali sacaton, galleta, Indian ricegrass and dropseeds. Grasses are still dominant but there is an increase in shrubs such as shadscale, snakeweed, jimmyweed and rabbitbrush. There is an increase of galleta and dropseeds and a decreased of Indian ricegrass.

### Pathway 1.1A Community 1.1 to 1.2

Increased surface disturbance from unmanaged grazing or other sources, prolonged drought.

### Pathway 1.2A Community 1.2 to 1.1

Managed grazing, improved climatic conditions/precipitation.

## **State 2**

### **Invaded Annuals State**

This community is a grassland dominated community with some forbs and low growing shrubs and non-native invasive annuals. Plant species most likely to invade or increase on this site with disturbance are broom snakeweed, black greasewood, annual forbs, and cheatgrass. Non-native annuals are present and well established in the plant community and could make up to 25% of the plant community.

### **Community 2.1**

#### **Perennial Grassland with Annuals**

This plant community is characterized by a dominance of grasses with few shrubs and forbs along with invasive native and non-native annuals present. Dominant grasses are Alkali sacaton, galleta, Indian ricegrass with lesser amounts of dropseeds. Non-native and native annuals are present in moderate amounts.

### **Community 2.2**

#### **Mixed Grasses and Shrubs with Annuals**

This plant community is characterized as a grassland with scattered shrubs and non-native annuals. Common grasses are alkali sacaton, galleta, Indian ricegrass and dropseeds. Common shrubs include shadscale, snakeweed, jimmyweed and rabbitbrush. Grasses are still dominant, but there is an increase in shrubs. Annuals include Russian thistle and cheatgrass.

### **Pathway 2.1A**

#### **Community 2.1 to 2.2**

Increased surface disturbance from unmanaged grazing or other sources, prolonged drought.

### **Pathway 2.2A**

#### **Community 2.2 to 2.1**

Managed grazing, improved climatic conditions/precipitation.

### **Transition T1A**

#### **State 1 to 2**

Unmanaged grazing, drought and a seed source for the establishment of non-native annuals. This is due to a loss of biotic integrity.

## **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	<b>Grasses</b>			280–435	
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	135–180	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	60–115	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	20–80	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–25	–
	Fendler's threeawn	ARPUF	<i>Aristida purpurea var. fendleriana</i>	0–20	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–20	–
	Grass, annual	2GA	<i>Grass, annual</i>	0–10	–
<b>Forb</b>					
2	<b>Forbs</b>			15–35	
	Forb, annual	2FA	<i>Forb, annual</i>	0–10	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–10	–
	rose heath	CHER2	<i>Chaetopappa ericoides</i>	0–5	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–5	–
	Fendler's springparsley	CYACF	<i>Cymopterus acaulis var. fendleri</i>	0–5	–
	herb sophia	DESO2	<i>Descurainia sophia</i>	0–5	–
	flatspine stickseed	LAOC3	<i>Lappula occidentalis</i>	0–5	–
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0–5	–
	desert Indianwheat	PLOV	<i>Plantago ovata</i>	0–5	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–5	–
	globemallow	SPHAE	<i>Sphaeralcea</i>	0–5	–
	stemless mock goldenweed	STAC	<i>Stenotus acaulis</i>	0–5	–
<b>Shrub/Vine</b>					
3	<b>Shrubs</b>			40–65	
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0–25	–
	Drummond's goldenbush	ISDR	<i>Isocoma drummondii</i>	5–25	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	5–15	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–15	–
	rubber rabbitbrush	ERNAB2	<i>Ericameria nauseosa ssp. nauseosa var. bigelovii</i>	0–10	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	0–5	–
	greasewood	SAVE4	<i>Sarcobatus vermiculatus</i>	0–5	–
	narrowleaf yucca	YUAN2	<i>Yucca angustissima</i>	0–5	–

## 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.

When deteriorated this site responds rather slowly to good management.

The potential plant community produced by this site provides food for those species of wildlife that utilize grass as a

major portion of their diet. When vegetative retrogression occurs, unpalatable shrubby species increase and some wildlife species may be benefit. The topography provides escape habitat.

## Recreational uses

Site is located on gently sloping tops of fan terraces and structural benches of plateaus which lend themselves to activities such as horseback riding, wildlife observation and photography.

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.

## Type locality

Location 1: Apache County, AZ	
Township/Range/Section	T41N R30E S10
General legal description	Teec Nos Pos Quad; Southeast corner of section 10, T41N, R30E. 3.5 miles northwest of Teec Nos Pos on the Navajo Indian Reservation, AZ.

## 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, Phoenix, AZ
Date	08/01/2012
Approved by	Byron Lambeth
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None expected
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2. **Presence of water flow patterns:** None expected, but very few expected on slopes. When water flow patterns are present they should not be connected and less than a foot wide.

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3. **Number and height of erosional pedestals or terracettes:** None expected, but a few expected on slopes.

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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 ranges from 35-65 percent. Biological soil crust can range from 5-30 percent.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** No wind scour or blowouts expected. None to very slight depositional areas around long lived perennial grasses and shrubs, especially during strong wind events or after prolonged droughts.

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7. **Amount of litter movement (describe size and distance expected to travel):** Some fine litter will remain at plant bases, but most will be transported by wind and water. Woody litter tends to remain under shrub canopies.

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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 expected average soil stability rating of 2, with ratings with canopy ranging 1-4 and ratings without canopy range 1-2.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface depth ranges from 3-6" in thickness with sandy loams and fine sandy loams. Structure associated with this site are weak medium platy structure parting to moderate granular structure with colors ranging from yellowish red (5YR 5/6) to light reddish brown (5YR 6/4).

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Vegetation is scattered across the landscape and consists of about 80 percent grasses, 15 percent shrubs and 5 percent forbs which promotes infiltration and reduces runoff. Average fetch or distance to nearest perennial plant base is 5 inches with a general range of 2 to 14 inches.

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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 will have subsurface horizons with strong accumulations of calcium carbonates (Bk horizon) and/or accumulations of sodium (Bn, Btn or Bkn horizons) that are not compacted layers.

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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: Perennial grasses (alkali sacaton, Indian ricegrass, galleta) >>

Sub-dominant: Shrubs (shadscale, jimmyweed, broom snakeweed) >

Other: Forbs > Succulents & Cacti

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** There may be some evidence of plant mortality in the perennial bunchgrasses such as stem remnants and standing dead; there may also be dead material at the base of actively growing perennial bunchgrasses and shrubs. The total amount of evident plant mortality may reach as high as 10% but should not exceed that amount.
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14. **Average percent litter cover (%) and depth ( in):**
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Expected total annual production in a normal year is 350 – 450 lbs/ac.
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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:** Shadscale, broom snakeweed and rabbitbrush are all native to the site, but can increase and dominate the shrub canopy with disturbance. Non-native annuals that can become established on the site and invade are cheatgrass and Russian thistle.
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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/or rhizomes except during the most severe droughts.
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