USDA Natural Resources Conservation Service

Ecological site R035XC326AZ
Sandy Loam Upland 10-14" p.z. Saline

Accessed: 05/08/2024

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.

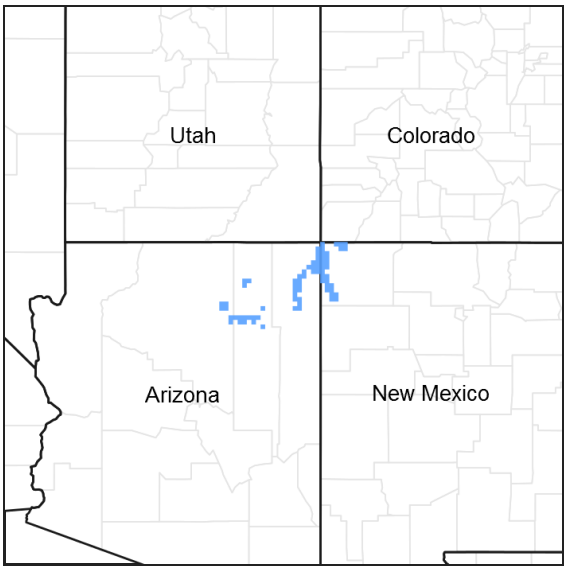

Figure 1. Mapped extent

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

Common Resource Area 35.3 – Colorado Plateau Sagebrush – Grasslands

This Common Resource Area 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. Elevations for the Common Resource Area where this ecological site may occur range from 4800 to 6700 feet and precipitation averages 10 to 14 inches. The elevation range is lower (about 4500 to 6000) on the western edge of the Colorado Plateau along the Grand Canyon, and moves up about 500 to 800 feet higher on the eastern side in the areas of the Navajo and Hopi Indian Reservations due to rain shadow effects from the Kaibab Plateau and Mogollon Rim. Common vegetation in this region includes Wyoming big sagebrush, Utah juniper, Colorado pinyon - cliffrose, Mormon tea, fourwing saltbush, blackbrush Indian ricegrass, needle and thread, western wheatgrass Galleta, black grama, blue grama, and sand dropseed. Sedimentary rock classes dominate the plateau with volcanic fields occurring for the most part near its margin. The soil temperature regime is mesic and the soil moisture regime is ustic aridic.

Table 1. Dominant plant species

Tree	Not specified

Shrub	(1) *Atriplex confertifolia*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Pleuraphis jamesii*

Physiographic features

This ecological site occurs on uplands with slopes of 0 to 15 percent. Landforms include fan terraces and summits associated with cuestas, mesas and structural benches. It occurs on Dakota sandstone and Mancos shale formations on the Colorado Plateau.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat (2) Plateau (3) Mesa
Flooding frequency	None
Ponding frequency	None
Elevation	1,463–2,042 m
Slope	0–15%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

Winter summer moisture ratios range from 70:30 to 60:40. 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 December through February. Accumulations above 12 inches are not common but can occur. Snow usually lasts for 3-4 days, but can persist much longer. Summer daytime temperatures are commonly 95 - 100 F and on occasion exceed 105 F. Winter air temperatures can regularly go below 10 F and have been recorded below - 20 F.

Table 3. Representative climatic features

Frost-free period (average)	168 days
Freeze-free period (average)	193 days
Precipitation total (average)	356 mm

Influencing water features

Soil features

Soils are deep with very fine sandy loam to sandy loam surfaces at least 3-6 inches deep. Subsoil textures range from fine sandy loam to sandy clay loam Water erosion hazard is moderate; wind erosion hazard is severe. Soils are moderately saline and slightly to strongly sodic. pH range is 7.4-9.0. Available water capacity is moderate.

This ecological site has been correlated to the following soil survey map unit components:

Chinle Area MU (AZ713) 27-Begay sodic

Hopi Area (AZ714) 8-Hano

Shiprock Area AZ/NM (AZ717) 304-Beclabito 320- Beclabito.

Table 4. Representative soil features

Parent material	(1) Residuum–sandstone and shale
Surface texture	(1) Sandy loam (2) Fine sandy loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to slow
Soil depth	102–203 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	12.7–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	5–20%
Electrical conductivity (0-101.6cm)	8–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–30
Soil reaction (1:1 water) (0-101.6cm)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	10–20%
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 estimated 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.

If there is significant loss of soil surface through erosion, if there a loss of the soil stability on the site due to active erosion on the site, if the hydrology of the site is significantly modified by increasing runoff amounts and/or patterns, if there are changes in availability of surface and subsurface water, or if the biotic integrity of the site is altered though changes in plant structural and functional types or the introduction of non-native species, then potential of the ecological site to return to the historic climax plant community can be lost, or restoration would require

significant inputs . The site deterioration results in the crossing of a threshold or irreversible boundary to another state, or equilibrium, for the ecological site. 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.

State and transition model

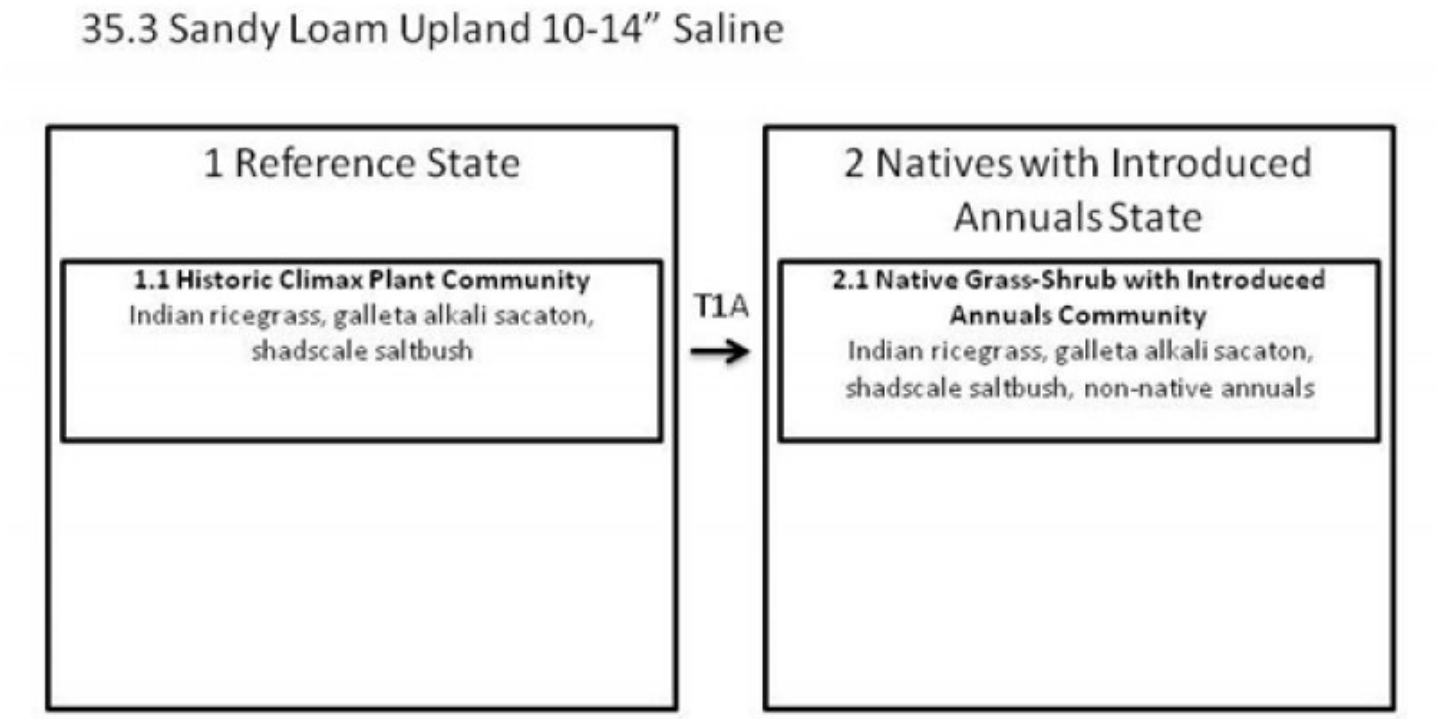

Figure 4. 353 SandyloamUpland Saline S&T

State 1
Reference State

Community 1.1
Historic Climax Plant Community

Figure 5. Sandy Loam Upland, Saline (ATCO, PLJA, ACHY)

This site has a plant community made up primarily of mid and short grasses with a relatively small percentage of forbs and shrubs. In the original plant community there is a predominance of grasses with shrubs, half shrubs. Grasses are abundant and include Indian ricegrass, galleta and alkali sacaton. Shadscale is the major shrub. Plant species most likely to invade or increase on this site when it deteriorates are broom snakeweed, rabbit brush, pricklypear cactus and annuals.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	252	336	392
Shrub/Vine	101	123	140
Forb	–	11	17
Total	**353**	**470**	**549**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-2%
Grass/grasslike foliar cover	5-10%
Forb foliar cover	0-1%
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 (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	0-3%	0-1%
>0.15 <= 0.3	–	0-3%	5-10%	0-1%
>0.3 <= 0.6	–	0-3%	–	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Figure 7. Plant community growth curve (percent production by month). AZ3503, 35.3 10-14" p.z. galleta. Growth begins in spring, most growth occurs during summer and early fall rainy season. Plants will green up again in the fall..

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

Figure 8. Plant community growth curve (percent production by month). AZ3505, 35.3 10-14" p.z. Indian ricegrass. Growth begins in spring, with semi-dormancy occurring during July through August. Plants will green up again in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	10	20	25	20	5	5	10	5	0	0

Figure 9. Plant community growth curve (percent production by month). AZ3507, 35.3 10-14" p.z. alkali sacaton. Growth begins in late spring, most growth occurs in summer and early fall..

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

Figure 10. 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 11. Plant community growth curve (percent production by month). AZ3531, 35.3 10-14" 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	1	3	17	18	10	19	20	10	1	1	0

State 2
Natives with Introduced Annuals State

Community 2.1
Native Grass-Shrub with Introduced Annuals Community

This site has a plant community made up primarily of mid and short grasses with a relatively small percentage of forbs and shrubs. There is a predominance of grasses with scatterd shrubs, half shrubs. Grasses are abundant and

include Indian ricegrass, galleta and alkali sacaton. Shadscale is the major shrub. Introduced annuals are present in the plant community at levels that begin to affect the biotic integrity of the native plant community.

Transition T1A
State 1 to 2

Introduction of non-native annuals species creates a irreversible change in the plant community

Transition T1A
State 1 to 2

Introduction of non-native grasses and forbs into 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 Perennial Grasses**			224–336	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	73–140	–
	alkali sacaton	SPAI	*Sporobolus airoides*	73–140	–
	James' galleta	PLJA	*Pleuraphis jamesii*	67–101	–
2	**Other Grasses**			22–56	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	6–22	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	6–22	–
	Grass, perennial	2GP	*Grass, perennial*	6–22	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–6	–
Forb					
3	**Forbs**			6–17	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	3–17	–
	Forb, perennial	2FP	*Forb, perennial*	6–11	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–6	–
	globemallow	SPHAE	*Sphaeralcea*	0–6	–
	Forb, annual	2FA	*Forb, annual*	0–6	–
Shrub/Vine					
4	**Shrubs**			101–140	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	50–84	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	6–17	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–17	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–11	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–10	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–6	–
	narrowleaf yucca	YUAN2	*Yucca angustissima*	0–6	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–6	–
	Greene's rabbitbrush	CHGR6	*Chrysothamnus greenei*	0–6	–

Animal community

Site is favorable for grazing throughout most of the year except when snow cover restricts availability of forage. With continuous grazing use during winter and spring, the relatively scarce cool season mid grasses are replaced by rabbit brush, snakeweed and lower value forbs and grasses. Planned grazing systems adapt well to use on this site.

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.

Continuous grazing during the winter and spring periods will decrease the cool season grasses, which are replaced by warm season, lower forage value grasses and shrubs.

Wildlife found on the site are pronghorn antelope, blacktail jackrabbit, snakes, mule deer, cottontail rabbit, lizards and coyote.

Recreational uses

Site is generally on toeslopes between cuestas and on footslopes and alluvial cones of escarpments. It produces high desert grasslands which can be very picturesque.

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

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

Type locality

Location 1: Apache County, AZ	
Township/Range/Section	T40N R31E S6
General legal description	Teec Nos Pos Quad; Northeast corner of section 6 T40N R31E; 2 mi Southeast of Teec Nos Pos, 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

HSH
Ken Gishi
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)	Kenneth Gishi
Contact for lead author	State Rangeland Management Specialist - NRCS State Office - Phoenix, AZ
Date	08/06/2012
Approved by	Steve Barker

Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Due to the low to medium runoff, well to somewhat excessively drained and moderate to rapid permeability, rills would not be expected on this site.

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2. **Presence of water flow patterns:** No water flow patterns would be expected on this site on level slopes due to the low to medium runoff, well to somewhat excessively drained and moderate to rapid permeability of these soils. On steeper slopes, a few water flow patterns may be present, especially following large storm events or where adjacent to rock outcrops.

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3. **Number and height of erosional pedestals or terracettes:** There may be a few occasional pedestals and terracettes, especially on steeper slopes and/or during a drought, due to the high wind erosion hazards of the soils.

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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 (soil surface cover) ranges from 40-60%. This site has the potential to produce a moderate amount of plant cover and litter due to a moderate amount of water available capacity. Drought may cause an increase in bare ground.

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5. **Number of gullies and erosion associated with gullies:** None. Any gullies present are stabilized with grasses and shrubs and should not be actively eroding.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Some wind scoured areas, blowouts and/or depositional areas may occur, especially during droughts due to high wind erosion hazard of the soils. There may be some slight deposition around long lived shrubs.

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7. **Amount of litter movement (describe size and distance expected to travel):** The majority of herbaceous and fine woody litter will be transported by wind and some by water in water flow pathways. Coarse woody litter will remain under shrub and tree 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):** Soil surface textures ranging from loamy fine sand to loam. When well vegetated, these soils have a moderate to high resistance to water erosion, but only a moderate resistance to wind erosion. Expected stability ratings of 4-5 under canopies and 2-3 in the interspaces.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Most soils have a fine granular structure. The typical thickness of the A-horizon is 3-8 inches. Typical surface color is yellowish red (5YR 5/6).

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 dominance of grasses with scattered shrubs, with lesser amounts of forbs and trees. Trees are often widely scattered sparsely across the site. Canopy cover ranges from 15-30% (grasses >> shrubs > forbs> trees and cacti). Basal cover ranges from 5-12% for vascular plants and 0-15% for biological crust. Both canopy and basal cover values decrease during a prolonged drought. This type of plant community is moderately effective at capturing and storing precipitation.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. These soils are not easily compacted. Some soils may have a massive structure and should not be confused with a compacted layer.

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 (needle and thread, Indian ricegrass, squirreltail) > Warm season grasses (blue grama, black grama, galleta, sand dropseed) >

    Sub-dominant: Shrubs (Mormon tea, fourwing saltbush, rabbitbrush, snakeweed > Forbs > Trees

    Other: Cacti & Yucca

    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 shrubs and trees the most. Severe summer droughts affect grasses the most.

14. **Average percent litter cover (%) and depth (in):** Litter depth ranges from 1 leaf thickness to 2 inches. Of the total litter amount, it would be expected that up to 90% would be herbaceous litter and 10-30 percent would be woody litter. There may be a slight increase of litter following a drought and decrease in later years.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** The expected total annual production is 550 – 650 lbs/ac in a normal precipitation 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:** Broom snakeweed, Greene's rabbitbrush, prickly pear, and juniper are all natives that have the potential to increase and co-dominate after disturbance. Cheatgrass and Russian thistle is an exotic annual that is becoming endemic to the site regardless of management or disturbance.

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 drought.
