USDA Natural Resources
Conservation Service

Ecological site R035XB267AZ
Sandy Loam Upland 6-10" p.z. Limy

Accessed: 05/13/2025

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex confertifolia* (2) *Gutierrezia sarothrae*
Herbaceous	(1) *Achnatherum hymenoides* (2) *Pleuraphis jamesii*

Physiographic features

This site occurs on abandonded stream terraces and summits and dipslopes of structural benches and cuestas. The soils on this site are moderately deep to very deep and well drained with sandy loam surface textures. Slopes range from 0 to 15 percent.

This site occurs in an upland position. It neither benefits significantly from run-in moisture nor does it suffer from excessive loss of moisture from runoff. It occurs on all exposures.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Structural bench (3) Cuesta
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)	160 days
Freeze-free period (average)	184 days
Precipitation total (average)	254 mm

Influencing water features

The soil moisture on this ecological site comes from precipitation. The site does not benefit significantly from run-on moisture. The sandy surface texture of the soil allows the site to capture the majority of both gentle winter storms and intense summer thunderstorms with little runoff.

Soil features

The soils on this site are moderately deep to very deep and well drained. These soils are highly calcareous throughtout the profile. Surface textures range from fine sandy loam to gravelly and channery sandy loam. The subsoil textures range from sandy loam to sandy clay loam. This site is characterized as having sufficient soil development to have accumlations of carbonates or clays at shallow depths within the soil profile. This helps the site hold available water within the rooting depths of the vegetation.

The hazard of water erosion is slight to moderate and the hazard of soil blowing is moderate.

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

SSA 713 Chinle Area 13-Typic Torriorthents;

SSA 717 Shiprock NM 102-Blackston, 137-Cairn.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone and sandstone
Surface texture	(1) Gravelly sandy loam (2) Channery fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderate to moderately slow
Soil depth	102–203 cm
Surface fragment cover <=3"	0–40%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	0–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	12–24%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	20–35%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The plant communities found on an ecological site are naturally variable. Composition and production will vary with yearly conditions, location, aspect, and the natural variability of the soils. The historical climax plant community represents the natural potential plant communities found on relict or relatively undisturbed sites. Other plant communities described here represent plant communities that are known to occur when the site is disturbed by factors such as grazing, fire, or drought.

Production data provided in this site description is standardized to air-dry weight at the end of the summer growing season. The plant communities described in this site description are based on near normal rainfall years.

NRCS uses a Similarity Index to compare existing plant communities to the plant communities described here. Similarity Index is determined by comparing the production and composition of a plant community to the production and composition of a plant community described in this site description. To determine Similarity Index, compare the production (air-dry weight) of each species to that shown in the plant community description. For each species, count no more than the maximum amount shown for the species, and for each group, count no more than the maximum shown for the group. Divide the resulting total by the total normal year production shown in the plant community description. If rainfall has been significantly above or below normal, use the total production shown for above or below normal years. If field data is not collected at the end of the summer growing season, then the field data must be corrected to the end of the year production before comparing it to the site description. The growth curve can be used as a guide for estimating production at the end of the summer growing season.

The State and Transition model shows the most common occurring plant communities likely to be encountered on

this ecological site. This model may not show every possible plant community, but only those that are most prevalent and observed through field inventory. As more data is collected these plant communities may be revised, removed, and some added to reflect the ecological dynamics of this site.

State and transition model

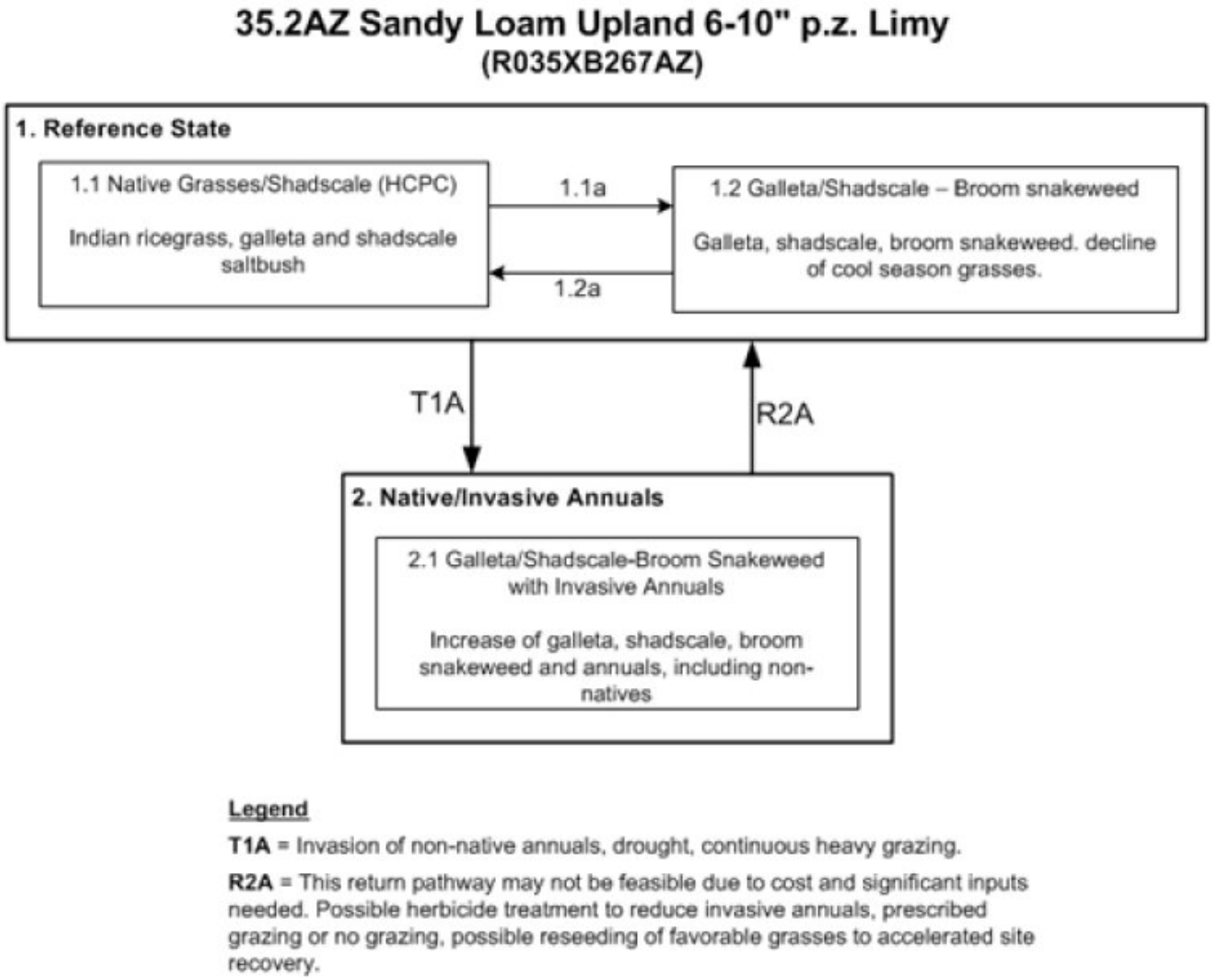

Figure 4. STM R035XB267AZ

State 1
Reference State

Community 1.1
Native Grasses/Shadscale (HCPC)

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

This site has a plant community made up primarily of mid and short grasses, short shrubs and a small percentage of forbs. In the original plant community there is a mixture of both cool and warm season grasses. Plant species most likely to invade or increase on this site when it deteriorates are cheat grass, russian thistle, galleta and broom snakeweed. Continuous grazing during the winter and spring will decrease the cool season grasses, which are replaced by lower forage value grasses and shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	230	303	375
Shrub/Vine	101	129	157
Forb	6	17	28
Total	**337**	**449**	**560**

Figure 7. 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 8. 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 9. 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

Figure 10. Plant community growth curve (percent production by month). AZ5216, 35.2 6-10" p.z. shadscale saltbush. Growth occurs mostly in the spring and early summer using stored winter moisture..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	20	50	20	5	0	0	0	0	0

Community 1.2
Galleta/Shadscale - Broom Snakeweed

This plant community is characterized by a mix of grasses and shrubs with dominant plants likegalleta, sand dropseed, alkali sacaton. shadscale and broom snakeweed. There is a decline or absence of cool season grasses.

Pathway 1.1a
Community 1.1 to 1.2

Drought, improper continuous grazing

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing or no grazing, favorable precipitation

State 2
Native/ Invasive Annuals

Community 2.1
Galleta/Shadscale with Invasive Annuals

This plant community is characterized by a mix of grasses and shrubs with invasive annuals. Dominant grasses are galleta, sand dropseed and alkali sacaton. There is a decline or absence of cool season grasses. Dominate shrubs are shadscale and broom snakeweed. Native and non-native annuals are present and well established. Annuals can make up to 25% composition by weight in the plant community.

Transition T1A
State 1 to 2

Invasion of non-native annuals, drought, continuous heavy grazing.

Restoration pathway R2A
State 2 to 1

This return pathway may not be feasible due to cost and significant inputs needed. Possible herbicide treatment to reduce invasive annuals, prescribed grazing or no grazing, possible reseeding of favorable grasses to accelerated site recovery.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			230–375	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	112–140	–
	James' galleta	PLJA	*Pleuraphis jamesii*	45–90	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	22–50	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	22–50	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–28	–
	Grass, perennial	2GP	*Grass, perennial*	0–11	–
	Grass, annual	2GA	*Grass, annual*	0–6	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–6	–
Forb					
2	**Forbs**			6–28	
	Forb, annual	2FA	*Forb, annual*	0–11	–
	Forb, perennial	2FP	*Forb, perennial*	0–11	–
	rose heath	CHER2	*Chaetopappa ericoides*	0–6	–
	globemallow	SPHAE	*Sphaeralcea*	0–6	–
Shrub/Vine					
3	**Shrubs**			101–157	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	67–101	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–28	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–11	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–6	–
	valley saltbush	ATCU	*Atriplex cuneata*	0–6	–

Animal community

This site is suitable for year-long grazing by all classes of livestock. Grazing systems adapt well to this site and should be used. This site has a moderate wind erosion hazard but with site deterioration, erosion occurs on overgrazed areas, roads, animal trails and concentration areas.

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. Lack of natural water limits use.

Recreational uses

This site is on high stream terraces, benches and cuesta dip slopes of undulating plateaus, the grassy aspect gives good aesthetic appeal. Winters are cold, and spring time is usually windy. The summers are typically mild with occasional Southwest thunderstorms.

Main recreation activities include hunting, horseback riding, wildlife observations and photography.

Type locality

Location 1: San Juan County, NM	
Township/Range/Section	T32N R19W S31

General legal description	Sallies Spring Quad, about 16 miles North West of Shiprock, NM. Navajo Reservation, NM.

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
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Date	08/27/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None expected. Some soils have a moderate cover of rock fragments.

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2. **Presence of water flow patterns:** None expected, but a few may occur on slopes. When water flow patterns are present they should not be connected and short. Some soils have a moderate cover of rock fragments.

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3. **Number and height of erosional pedestals or terracettes:** None, but slight deposition or mounding around long lived perennial plants is expected.

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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 30-55 percent. Biological soil crust can range from 0-10 percent and should not be counted as bare ground.

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

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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):** 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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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 is 3-4, with under canopy ratings ranging from 2-6 and ratings without canopy range 1-3.

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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 2-4 inches thick with textures of gravelly sandy loam, channery fine sandy loam, and loamy coarse sand. Structure associated with this site is moderate (coarse, very thick) platy structure parting to moderate (weak, fine) granular structure with colors variable depending on parent material.

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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 60-80 percent composition of grasses, 25-35 percent shrubs and 1-5 percent forbs and this promotes infiltration and reduces runoff. Average fetch or distance to nearest perennial plant base is 5 inches with a general range of 1 to 11 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.

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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 > Warm season grasses >

    Sub-dominant: Shrubs >

    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):**

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.

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Broom snakeweed and galleta are native to the site, but can increase and dominate the with disturbance. Non-native annuals that can become established on the site and invade are cheatgrass and especially Russian thistle.

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.