USDA Natural Resources Conservation Service

Ecological site R035XB268AZ
Shale Hills 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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex confertifolia* (2) *Atriplex falcata*
Herbaceous	(1) *Sporobolus airoides* (2) *Pleuraphis jamesii*

Physiographic features

This ecological site is in an upland position on shale bedrock with overall slopes ranging from 15 to 60 percent, but there may be flatter areas within the site. The soils are shallow to bedrock.

This site occurs on footslopes and backslopes of plateaus, mesas, and structural benches; on footslopes and backslopes of escarpments of mesas, cuestas, and hogbacks; and on knolls, footslopes, and backslopes of hills. This site is excessively drained and is subject to significant amounts of runoff.

Table 2. Representative physiographic features

Landforms	(1) Mesa (2) Hill (3) Structural bench
Elevation	1,158–1,768 m
Slope	15–60%
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. Shallow bedrock areas will concentrate water in deeper soil pockets, where most of the vegetation production occurs. Because of the shallow soils and steep slopes, larger rainfall events will not be effectively captured by the site. This site contributes runoff to other ecological sites.

Soil features

The soils on this site are shallow to moderately deep and formed in residuum and alluvium derived from shale. Surface textures are typically fine sandy loam to clay loam with various amounts of rock fragments. The soil surface may have a gravelly or channery surface. The subsoil textures range from clay, to silty clay loam. Soft shale is shallow (<20") but there may be some small areas with deeper soils. The water erosion hazard is severe, and the wind erosion hazard is moderate to severe.

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

SSA-715 Fort Defiance Area AZ/NM MU's 7 & 19 Hanksville and 22 & 34 Chipeta family;

SSA 717 Shiprock NM/AZ - MU's 110 Genats part, 130 Genats part, 150 Chipeta part.

Table 4. Representative soil features

Parent material	(1) Alluvium–shale
Surface texture	(1) Channery loamy fine sand (2) Channery silt loam (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderately slow
Soil depth	25–51 cm
Surface fragment cover <=3"	15–35%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	0–12.7 cm
Calcium carbonate equivalent (0-101.6cm)	1–3%
Electrical conductivity (0-101.6cm)	2–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–30
Soil reaction (1:1 water) (0-101.6cm)	7.8–8.6
Subsurface fragment volume <=3" (Depth not specified)	5–15%

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

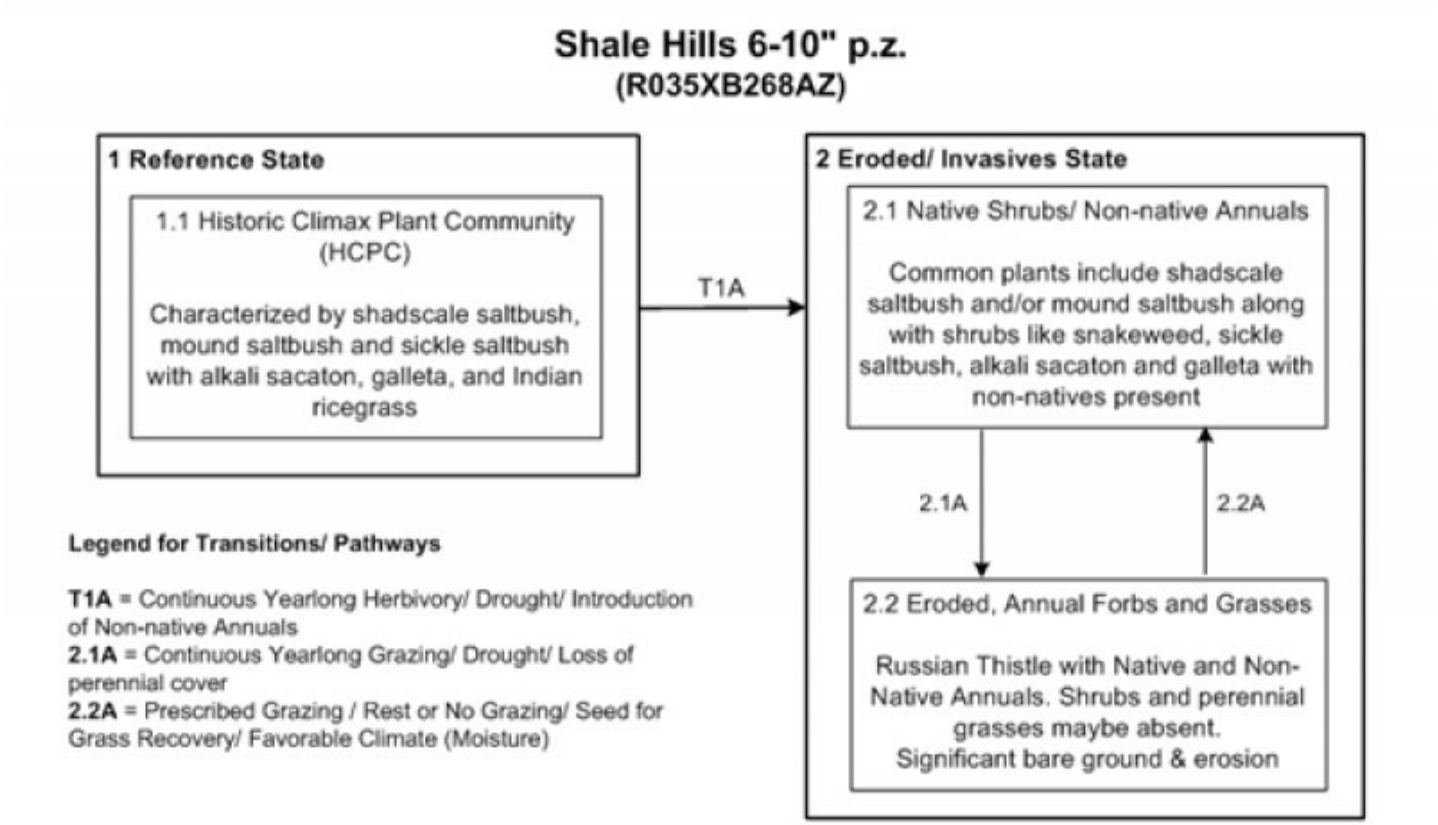

Figure 4. STM - R035XB268AZ

State 1
Reference State

This site has a plant community made up primarily of a mixture of shrubs and perennial grasses with a small percentage of forbs. In the original plant community (HCPC), there is a mixture of cool and warm season plants. Plant species most likely to invade or increase on this site when it deteriorates are Russian thistle, other native and non-native annual forbs, mound saltbush, shadscale, and sickle saltbush.

Community 1.1
Historic Climax Plant Community

Figure 5. Shale Hills 6-10" p.z.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	78	112	146
Shrub/Vine	78	112	146
Forb	6	11	17
Total	**162**	**235**	**309**

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). AZ5203, 35.2 6-10" p.z. alkali sacaton. Growth begins in the spring, most growth occurs in the summer, goes dormant in the fall..

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

Figure 10. Plant community growth curve (percent production by month). AZ5210, 35.2 6-10" p.z. mound saltbush. Growth begins in spring and continues through the summer. Seed stalk extension occurs in late summer with seed set in the fall..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	20	25	15	15	10	5	5	0	0

Figure 11. 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

State 2
Saltbush & Non-Natives

In this state, the structure and function of the original plant community has been lost. Most site have high amounts of bare ground with sparse or very little vegetation cover. Shrubs along with annual forbs and grasses, including non-natives, dominate the plant community when vegetated.

Community 2.1
Native Shrubs/ Annuals

This plant communty is the result of continous disturbance through climate fluctuations and improper grazing management. Other surface disturbances, such as introduction of invasive species and off-road vehicles can also reduce ground cover of favorable species. In this plant community phase desirable native grasses like James' galleta and alkali sacaton have decreased, and less desirable shrubs like shadscale and mound saltbush have increased. Prescribed grazing management, rest, and favorable climate periods will for the potential of native grasses to increase. Non-native annuals are present, along with native annuals. Annuals make up to 15% of the platn community composition.

Community 2.2
Eroded/ Annual Forbs and Grasses

This site is the result of continous disturbance through climate fluctuations and improper grazing management. Other surface disturbances, such as invasive species and off-road vehicles can also reduce ground cover of favorable species. In this plant community phase desirable native grasses like James' galleta and alkali sacaton have decreased, and less desirable shrubs like shadscale and mound saltbush have increased. Prescribed grazing management, rest, and favorable climate periods will for the potential of native grasses to increase.

Pathway 2.1A
Community 2.1 to 2.2

Continuous Yearlong Grazing/ Drought/ Loss of perennial cover

Pathway 2.2A
Community 2.2 to 2.1

Prescribed Grazing / Rest or No Grazing/ Seed for Grass Recovery/ Periods of Favorable Precipitation

Transition T1A
State 1 to 2

Continuous Yearlong Herbivory/ Drought/ Introduction of Non-native Annuals. There is a loss of biotic integrity.

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**			78–146	
	alkali sacaton	SPAI	*Sporobolus airoides*	34–56	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	11–28	–
	James' galleta	PLJA	*Pleuraphis jamesii*	11–28	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–17	–
	Grass, annual	2GA	*Grass, annual*	0–11	–
	Grass, perennial	2GP	*Grass, perennial*	0–11	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0–11	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–6	–
Forb					
2	**Forbs**			2–17	
	Forb, annual	2FA	*Forb, annual*	2–6	–
	Forb, perennial	2FP	*Forb, perennial*	2–6	–
	Powell's saltweed	ATPO2	*Atriplex powellii*	0–6	–
	globemallow	SPHAE	*Sphaeralcea*	0–6	–
Shrub/Vine					
3	**Shrubs**			78–146	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	28–56	–
	sickle saltbush	ATFA	*Atriplex falcata*	11–34	–
	mound saltbush	ATOB	*Atriplex obovata*	11–34	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–11	–
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0–6	–
	Greene's rabbitbrush	CHGR6	*Chrysothamnus greenei*	0–6	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0–6	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–6	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–6	–

Animal community

This site is typically steep, which severely restricts use by animals especially livestock. Proper distribution is often impossible to attain, and heavy use occurs on the limited accessible areas. Care should be taken to not over use this site, as recovery will be very slow, and erosion will be accelerated.
The small amount of vegetation produced is offset by the variety which attracts many species of wildlife. The steep slopes and broken topography provide safety from danger.

Recreational uses

This site occurs on hillslopes, backslopes, footslopes, and knolls of hills, bench escarpments, and mesas. This site has a highly diversified plant complex of grasses, shrubs, and forbs which gives an excellent aesthetic visual effect in contrast to the surrounding topography.
Winters are cold, and it is windy in the spring. Summer is relatively mild with typical Southwest thunderstorms. Main activities include hiking, hunting, rock hounding, and photography.

Type locality

Location 1: San Juan County, NM

Township/Range/Section	T24N R17W S28
General legal description	Cuestas that run from the Hogback east of Shiprock, NM. south to Sheep Springs area.

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.

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Date	03/19/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Somewhat common, due to steep slopes. Rills are 10 to 16 feet long. Site with significant amounts of coarse fragments will have shorter rills and less frequent.

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2. **Presence of water flow patterns:** Somewhat common throughout site. Water flow patterns may be long and lacking sinuosity. There may be occasional connectiveness of WFP on steep slopes. On sites with significant amounts of coarse fragments will have less evident flow patterns.

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3. **Number and height of erosional pedestals or terracettes:** Some long-lived plants may show some slight pedestals of less than a 1” on slopes. Terracettes are few.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expected bare ground range 20-50 depending on surface rock fragments.

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5. **Number of gullies and erosion associated with gullies:** Very few. When site is well vegetated and covered with rock fragments gullies are stable and will only show minor signs of active erosion.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Deposition and blowouts by wind are not expected.

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7. **Amount of litter movement (describe size and distance expected to travel):** Due to steepness of the site, litter redistribution by water is common and expected in water flow patterns.

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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-site stability is 3. Surface fragments, litter, and vegetation cover aid in reducing erosion.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface horizon is 2 to 4 inches deep. Structure is mostly weak thin platy to moderate very fine granular structure. Surface colors are light olive brown, dark greyish brown, brown, and olive brown.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Due to steepness and various amounts of rock fragments of this site, vegetation only has a minimum effect on infiltration and runoff. This site is characterized by a relatively even distribution of grasses with scattered shrubs and is well distributed across the site and lends to slowing runoff and allowing for some 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.

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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: Salt tolerant Shrubs (Shadscale, Sickle saltbush & Mound saltbush) > > Warm season perennial grasses

    Sub-dominant: Cool season perennial grasses > other half-shrubs > forbs

    Other:

    Additional:

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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):** Herbaceous litter is not persistent on the site.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** The expected annual total production in an average year is 175 – 225 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:** Shadscale, mound saltbush, sickle saltbush, and annual forbs are native to the site but may have the potential to increase with continued disturbance. Cheatgrass, annual wheatgrass, and Russian thistle are non-native annuals that have the potential to invade the site with or without 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 during the most severe droughts.