Ecological site R035XB203AZ
Clay Loam Upland
6-10" p.z.
Saline

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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.

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.

Ecological site concept

Soils grouped on this site are deep. Surface textures are predominantly clay loam to clay. Parent material is alluvium from sandstone, shale, and mudstone. Site located in an upland position on alluvial fans, stream terraces and fan remnants. Slopes generally range from 0 to 15 percent.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Atriplex canescens* (2) *Atriplex obovata*
Herbaceous	(1) *Sporobolus airoides* (2) *Pleuraphis jamesii*

Physiographic features

Site located in an upland position on alluvial fans, stream terraces and fan remnants.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Stream terrace (3) Fan remnant

Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Elevation	1,160 – 1,770 m
Slope	0 – 20 %
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)	180 days
Freeze-free period (average)	210 days
Precipitation total (average)	250 mm

Influencing water features

This site occurs in an upland position. The soil moisture on this ecological site comes from precipitation. It neither benefits from run-in moisture nor sustains excessive runoff.

Soil features

Soils on this site are deep. Surface textures are predominantly Clay loam to Clay (non-shrinking). Subsurface textures are typically Clay loam, Clay, Silty clay, Sandy clay loam, Sandy loam. Geologic formation: Mancos shale, Moenkopi, Mesa Verde group.

Parent material is alluvium from sandstone, shale, and mudstone. Available water capacity: moderate to high. Hazard of erosion by water: slight to moderate - wind: moderate to high. Soil moisture regime: Typic aridic Soil temperature regime: mesic.

Major Taxonomic units included:

SSA-633 Navajo County Central Part - MU 46 Penzance;
SSA-711 Navajo Mountain Area MU's 51 Massadona, 58 Typic haplocambids;
SSA-713 Chinle Area MU 12 Gotho & Chromic Haplotorrents;
SSA-715 Fort Defiance Area (AZ-NM) MU's 58 Burnswick, 88 Polacca, 94 95 & 96 Redlands.

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale
Surface texture	(1) Clay loam (2) Sandy clay (3) Silty clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow to slow
Soil depth	100 – 150 cm
Surface fragment cover <=3"	0 – 10 %
Available water capacity (0-101.6cm)	12.7 – 25.4 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 10

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 data provided in this site description is standardized to the air-dry weight of one year's growth. The plant communities described in this site description are based on near normal rainfall years.

State and transition model

Figure 3. State and Transition Model – R035XB203AZ

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	**Grasses**			432-527	
	alkali sacaton	SPAI	*Sporobolus airoides*	123-191	–
	James' galleta	PLJA	*Pleuraphis jamesii*	90-123	–
	blue grama	BOGR2	*Bouteloua gracilis*	34-67	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	0-34	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0-28	–
	Grass, perennial	2GP	*Grass, perennial*	0-28	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6-28	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	6-28	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0-11	–
	Grass, annual	2GA	*Grass, annual*	0-11	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0-6	–
Forb					
2	**Forbs**			11-34	
	Forb, perennial	2FP	*Forb, perennial*	0-20	–
	Forb, annual	2FA	*Forb, annual*	0-7	–
	milkvetch	ASTRA	*Astragalus*	0-6	–
	rose heath	CHER2	*Chaetopappa ericoides*	0-6	–
	mealy goosefoot	CHIN2	*Chenopodium incanum*	0-6	–
	bighead dustymaiden	CHMA	*Chaenactis macrantha*	0-6	–
	American bugseed	COAM8	*Corispermum americanum*	0-6	–

	Wright's bird's beak	COWR2	*Cordylanthus wrightii*	0-6	–
	thicksepal cryptantha	CRCR3	*Cryptantha crassisepala*	0-6	–
	nodding buckwheat	ERCE2	*Eriogonum cernuum*	0-6	–
	divergent buckwheat	ERDI5	*Eriogonum divaricatum*	0-6	–
	fleabane	ERIGE2	*Erigeron*	0-6	–
	desert trumpet	ERIN4	*Eriogonum inflatum*	0-6	–
	flatspine stickseed	LAOC3	*Lappula occidentalis*	0-6	–
	whitestem blazingstar	MEAL6	*Mentzelia albicaulis*	0-6	–
	cleftleaf wildheliotrope	PHCR	*Phacelia crenulata*	0-6	–
	gypsum phacelia	PHIN	*Phacelia integrifolia*	0-6	–
	woolly plantain	PLPA2	*Plantago patagonica*	0-6	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0-6	–
	gooseberryleaf globemallow	SPGR2	*Sphaeralcea grossulariifolia*	0-6	–
	spear globemallow	SPHA	*Sphaeralcea hastulata*	0-6	–
	small-leaf globemallow	SPPA2	*Sphaeralcea parvifolia*	0-6	–
	heartleaf twistflower	STCO6	*Streptanthus cordatus*	0-6	–
	small wirelettuce	STEX	*Stephanomeria exigua*	0-6	–
	Wooton's sandpuffs	TRCAW2	*Tripterocalyx carneus var. wootonii*	0-6	–
Shrub/Vine					
3	**Shrubs**			90-179	
	fourwing saltbush	ATCA2	*Atriplex canescens*	34-67	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	6-28	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	6-28	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0-19	–
	Bigelow sage	ARBI3	*Artemisia bigelovii*	0-11	–
	mound saltbush	ATOB	*Atriplex obovata*	0-11	–
	Greene's rabbitbrush	CHGR6	*Chrysothamnus greenei*	0-11	–
	pale desert-thorn	LYPA	*Lycium pallidum*	0-11	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0-11	–
	rubber rabbitbrush	ERNAB2	*Ericameria nauseosa ssp. nauseosa var. bigelovii*	0-11	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0-11	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0-6	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0-6	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	0-6	–
	Torrey's jointfir	EPTO	*Ephedra torreyana*	0-6	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

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. The potential plant community provides a variety of food and cover plants for wildlife. When the vegetation complex retrogresses then unpalatable shrub species increase and the site becomes less usable as a foraging area for some species. Grazing practices that encourage cool season grass species are beneficial to antelope, cottontails and rodents. Shrubs that provide both food and cover should be maintained.

Recreational uses

Site is located on gently sloping plains and mesa tops which lend themselves to activities such as horseback riding, wildlife observation and hunting. 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: Navajo County, AZ	
Township/Range/Section	T20N R15E S2
General legal description	State Location: Sections 2 & 3, T20N, R15E 10 Miles North of Winslow along Hwy 71.

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.

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Approval

Kendra Moseley, 5/20/2025

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)	Ken Gishi, Dean Schlichting, Dan Carroll
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Date	10/19/2010

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

Indicators

1. **Number and extent of rills:** **None expected. Some rill formation is possible, especially on the steeper slopes, due to the loamy surface textures, moderately slow permeability, and medium runoff.**

2. **Presence of water flow patterns:** **Some minor water flow patterns present, due to the moderately slow permeability and medium runoff characteristics of the soil. Water flow patterns usually less than 6 feet in length with 5-15 percent cover.**

3. **Number and height of erosional pedestals or terracettes:** **Short pedestals are common on long lived perennial half shrubs and grasses, ranging in height from up to 1-2 inches; terracettes are uncommon. Some terracettes may form, especially on the steeper slopes, due to the moderately slow permeability and medium runoff characteristics.**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** **Bare ground averages about 35-55%. Drought may cause a temporary increase in bare ground.**

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** **None present on this site.**

7. **Amount of litter movement (describe size and distance expected to travel):** **Herbaceous fines mainly transported by wind and in water flow pathways. Coarser herbaceous and woody litter will remain under shrub canopies.**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** **Soil surface textures are mostly fine sandy loam, sandy clay loam and clay loam and when well vegetated soils have a moderate resistance to water erosion and a moderate to high resistance to wind erosion. Soil-site aggregate stability ratings should average 3-4 under camopies with a range of 1-5. The aggregate stability ratings should average 2-3 under plant canopies with a range of 1-3.**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is mostly granular (weak to moderate; fine) and some platy (weak to moderate; thin to strong). Surface thickness is mostly 2 to 4 inches, but ranges up to 8 inches. Color is variable depending upon parent material with hues of 5YR to 10YR.

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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 mid and short grasses with scattered shrubs. The plant community composition (by weight) consists of about 70-80% grasses, 15-20% shrubs, 1-5% forbs and 0-1% succulents. Canopy cover ranges from 25 to 40 percent, with most cover provided by grasses. Basal cover range from 10-15%. WHen well vegetated this site is moderately effective at capturing and storing precipitation. High grass cover and moderate litter cover aids in reducing raindrop impact and promoting 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. Some soils will have a well developed shallow argillic horizon on this site that feels like a compacted layer, but is not.

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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: warm season bunchgrasses >>

    Sub-dominant: warm season colonizing grasses > shrubs > cool season bunch grasses >

    Other: forbs > cacti(trace)

    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. Sever winter droughts affect shrubs most. Severe summer droughts affect grasses the most.

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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):** Average annual total production on this site is expected to be 500 to 600 lbs/ac in a year of average annual production.

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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:** Broom snakeweed, Greene rabbitbrush, Whipple cholla, Black greasewood, shadscale and sixweeks fescue occur naturally on this site, but can increase with disturbance. Nonnative plants that have the potential to invade this site are cheatgrass, ripgut brome and Russian thistle. Native annuals

that have the potential to invade this site with disturbance are Crypthantha, mealy goosefoot, whitestem blazingstar, woolly plantain, foxtail barley and flatspine stickseed.

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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 except during the most severe droughts**
