USDA Natural Resources Conservation Service

Ecological site R035XB211AZ
Loamy Wash 6-10" p.z. Saline-Sodic

Accessed: 05/04/2024

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.

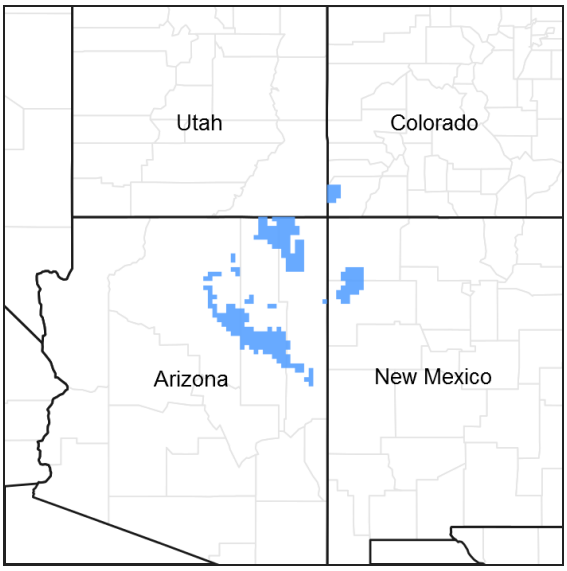

Figure 1. Mapped extent

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

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.

Associated sites

R035XB216AZ	**Sandy Wash 6-10" p.z.** This site occurs on the floodplains adjacent to the stream terraces of this site.

Similar sites

R035XB209AZ	**Loamy Wash 6-10" p.z.** This site occurs in washes however is frequently flooded and lacks the buildup of salts that occur on R035XB211AZ.

Table 1. Dominant plant species

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

Physiographic features

This site occurs in the drainage or bottom positions on the landscape that have the potential to flood following storm events. The surface textures are loamy. The soils are deep and well drained. Slopes range from 0 to 5 percent.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Playa
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to frequent
Elevation	1,158–1,768 m
Slope	0–5%
Water table depth	152–251 cm
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)	254 mm

Influencing water features

This ecological site is located in the low areas along the drainages where runoff water flows following rainfall events. The soil moisture on this site is from both rainfall, and run-on moisture from the watershed above it. This additional water makes this site much more productive than the adjacent uplands that only receive moisture from rainfall.

Soil features

These soils are stratified flow deposited soils that are deep and well drained, formed from mixed alluvium. The surface layer texture range from very fine sandy loam to sandy clay loam. The subsurface textures are typically loamy, but may have stratafied layers of coarser and finer textures. The soils are saline and/or sodic throughout the profile. Available water capacity is 6 to 13 inches. Effective rooting depth is more than 60 inches. Permeability is moderately slow to slow. Runoff is very slow to moderate.
Soil survey map unit components that have been correlated to this ecological site include:

SSA 631 Coconino Central - MU 50 Torrifluvents Saline;
SSA 633 Navajo County Central - MU's 40 & 41 Navajo, 68 & 69 Tours, 24 & 25 Ives, 27, 28 & 29 Jocity;
SSA 635 Apache County Central - MU's NIA Navajo, Tu Tours;
SSA-707 Little Colorado River Area MU's 16-Ives, 17-Jocity, 19-Joraibi, 20 Jocity, 21 Jocity, 61-Tours;
SSA 714 Hopi - MU's 13 Jocity, 14 Joraibi, 41 Uzona;
SSA-715 Fort Defiance Area (NM/AZ) MU's 98 Typic Torrifluvents, 134-Jocity;
SSA 717 Shiprock NM - MU 105 Hamburn.

Table 4. Representative soil features

Parent material	(1) Flow deposits–sandstone and shale (2) Alluvium–limestone and sandstone
Surface texture	(1) Very fine sandy loam (2) Gravelly loam (3) Sandy clay loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	102–203 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–5%
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	8–30 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	10–25
Soil reaction (1:1 water) (0-101.6cm)	7.9–9

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.

This site has higher levels of accumulated salts due to position on the landscape and the underlying geology. Areas of increased salts seal the soil surface and prevent most plants from germinating. These areas become depressional and become sites for precipitation to accumulate, evaporate, and increase the salt content. The natural plant community of shrubs and grasses grow at the edges of these sites and in drifts of eolian sand that have accumulated, which allow the plants to germinate.

State and transition model

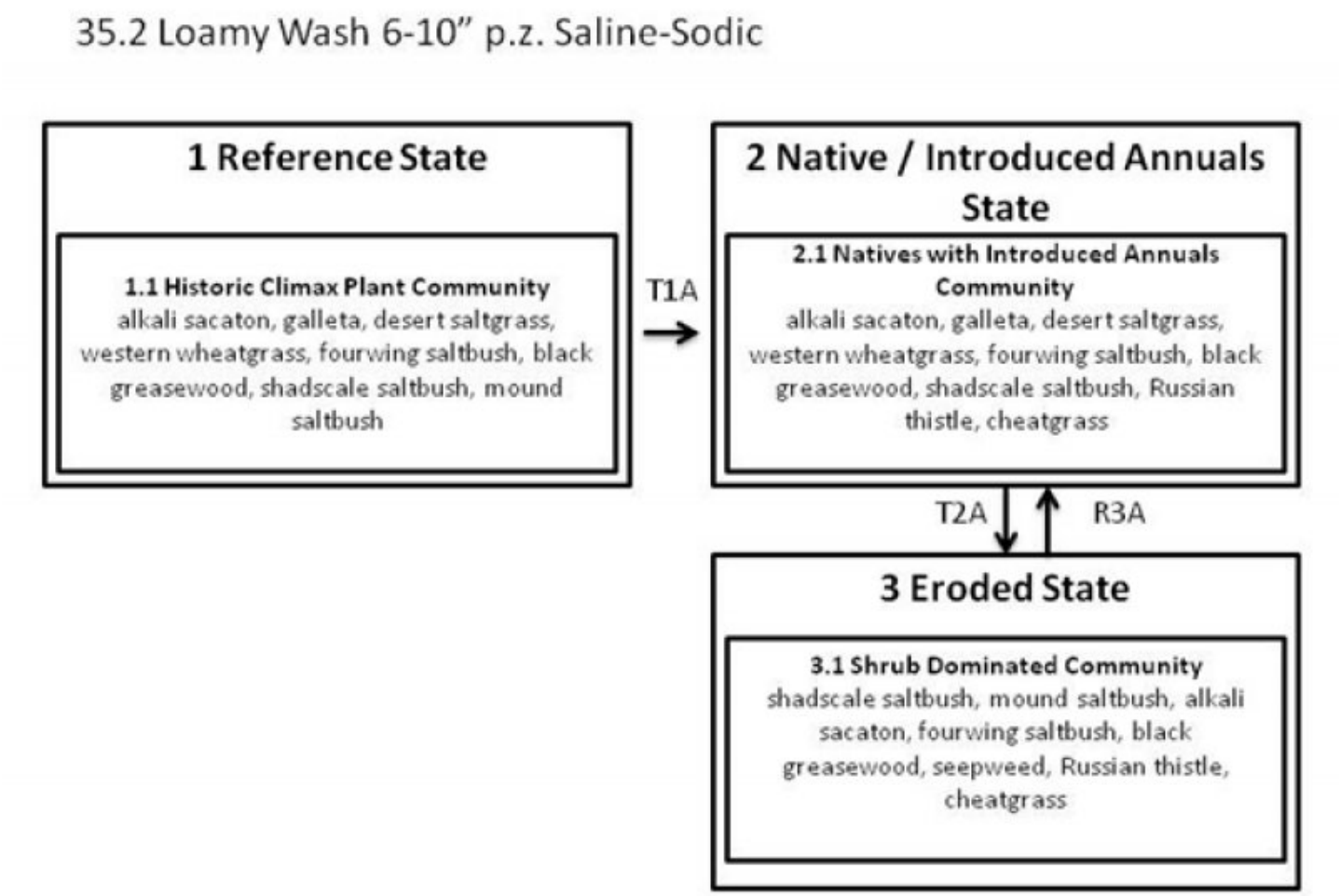

Figure 4. 35.2 Loamy Wash Saline Sodic S&T

State 1
Reference State

Community 1.1
Historic Climax Plant Community

Figure 5. 35.2 Loamy Bottom Historic Climax Plant Community

The plant community is made up primarily of mid and short grasses and shrubs with a relatively small percentage of forbs. In the original plant community there is a mixture of both cool and warm season grasses.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	560	841	897
Shrub/Vine	140	196	224
Forb	6	17	22
Total	**706**	**1054**	**1143**

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). 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

State 2
Natives / Introduced State

This state is what land managers should work towards in maintaining a healthy present plant community on this site. Communities fluctuate between areas of natural shrubland-grassland areas of salt tolerant species such as mound saltbush and alkali sacaton, to areas of patchy vegetation or salt-affected bare areas.

Community 2.1
Natives with Introduced Annuals Community

This community is similar to the Historic Climax Plant Community, but introduced annuals are now part of the plant community and compete with native species on the site. Drought, unmanaged grazing or other disturbances that reduce the perennial grass component may allow the more agressive introduced species like Russian thisle to continue increasing on the site.

State 3
Eroded State

This state consists of playas and other bare areas that are bowl-shaped and catch water and sediment; these areas may also be eroded or denuded sites due to large amounts of salts in the area or heavy grazing.

Community 3.1
Patchy Shrub Community

Figure 9. 3.1 Patchy Shrub Community

The community phase is characterized by large bare soil areas where sodic subsoils have become exposed, and small shrub islands that are able to capture aeolian soil deposits that can support plant production. Plant species most likely to invade or increase on this site when it deteriorates are camelthorn, greasewood, shadscale, wooly groundsel, and native and introduced annuals.

Transition T1A
State 1 to 2

Introduced annuals such as Russian thistle and cheatgrass move into the plant community and compete with the native species.

Transition T2A
State 2 to 3

Loss of perennail herbaceous species due to drought, unmanaged grazing, or other disturbances allows the surface soil to erode from wind and water, exposing the more sodic subsoils which do not support plant growth.

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	**Dominant Perennial Grasses**			504–785	
	alkali sacaton	SPAI	*Sporobolus airoides*	112–336	–
	blue grama	BOGR2	*Bouteloua gracilis*	50–143	–
	vine mesquite	PAOB	*Panicum obtusum*	41–135	–
	James' galleta	PLJA	*Pleuraphis jamesii*	56–112	–
	saltgrass	DISP	*Distichlis spicata*	56–112	–
2	**Other Grasses**			56–224	
	vine mesquite	PAOB	*Panicum obtusum*	11–56	–
	western wheatgrass	PASM	*Pascopyrum smithii*	11–56	–
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	11–56	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	6–34	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	6–34	–
	Grass, annual	2GA	*Grass, annual*	0–11	–
	Grass, perennial	2GP	*Grass, perennial*	0–11	–
Forb					
3	**Forbs**			6–22	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	34–59	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	22–34	–
	Forb, perennial	2FP	*Forb, perennial*	11–22	–
	Forb, annual	2FA	*Forb, annual*	6–17	–
Shrub/Vine					
4	**Dominant Shrubs**			157–224	
	fourwing saltbush	ATCA2	*Atriplex canescens*	112–168	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	22–45	–
	mound saltbush	ATOB	*Atriplex obovata*	22–45	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	22–45	–
	seepweed	SUAED	*Suaeda*	22–45	–
5	**Other Shrubs**			11–45	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	6–34	–
	threadleaf ragwort	SEFL3	*Senecio flaccidus*	6–34	–

Animal community

This site is suitable for grazing during any period of the year by cows and calves, stocker cattle. It produces large amounts of good quality forage during all grazing periods. 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 that utilize grass as a portion of their diet. When the vegetation complex retrogresses then unpalatable shrub species increase and the site becomes less usable as a foraging area for some species.

Recreational uses

This site is found in grassy swales and flood plains, characterized by open grasslands interspersed with a few flowering forbs and shrubs.

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

Activities include hunting, camping, hiking, and horseback riding.

Inventory data references

Liu, D., J. Abuduwaili, J. Lei and G. Wu. 2010. Deposition rate and chemical composition of the aeolian dust from a bare saline playa, Ebinur Lake, Xinjiang, China. Water, air and soil pollution. In press, 2011.

Wu, L., A.W. Enberg and X. Guo. 1997. Effects of elevated selenium and salinity concentrations in root zone on selenium and salt secretion in saltgrass (Distichlis spicata L.). Ecotoxicology and Environmental Safety 37: 251-258.

Aschenbach, T. 2006. Variation in growth rates under saline conditions of Pascopyrum smithii (Western wheatgrass) and Distichlis spicata (Inland saltgrass) from different source populations in Kansas and Nebraska: Implications for the Restoration of salt-affected plant communities. Restoration Ecology 14(1): 21-27.

Gill, T.E. 1996. Eolian sediments generated by anthropogenic disturbance of playas: human impacts on the geomorphic system and geomorphic impacts on the human system. Geomorphology 17:207-228.

Type locality

Location 1: Navajo County, AZ	
General legal description	George McLaws ranch, southwest of Holbrook, AZ Curry Jones (Finley) ranch, east of Holbrook, AZ

Other references

Information and updates collected during 2009-2010 for this ESD was conducted as part of an Interagency Technical Assistance Agreement between the Bureau of Indian Affairs–Navajo Region and the NRCS-Arizona.

Liu, D., J. Abuduwaili, J. Lei and G. Wu. 2010. Deposition rate and chemical composition of the aeolian dust from a bare saline playa, Ebinur Lake, Xinjiang, China. Water, air and soil pollution. In press, 2011.

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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)	Jennifer Puttere
Contact for lead author	Flagstaff MLRA Soil Survey Office
Date	03/22/2011
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** 1 to 2 rills per 150 foot transect.

2. **Presence of water flow patterns:** Several (5 to 6) water flow patterns per 150 foot tape.

3. **Number and height of erosional pedestals or terracettes:** None

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10 to 15% bare ground

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** Bare scoured areas with high levels of salts occur irregularly throughout the site

7. **Amount of litter movement (describe size and distance expected to travel):** Litter remains in place under shrubs and grasses; small amounts may be swept into scoured areas by water or moved short distances by wind (less than 1 foot)

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Wind-scoured sodic bare areas will have stability values of 1 to 2; vegetated areas with samples taken under canopy will be 3-5.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure will be platy on bare wind-scoured sodic areas; surface structure will be granular or platy under grass and shrub canopy. Soil organic matter will increase under any canopy cover and decrease as vegetation decreases on the surface.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Increased infiltration on areas that have canopy cover; decreased infiltration in areas that have been wind-scoured; these areas may collect water and due to decreased infiltration rates water may pool in these areas; as the water evaporates salts will increase and concentrate.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None; may be difficult to excavate

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: Grasses > shrubs > bare ground

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** None

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):** 700-1600 lbs/acre

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:** Russian thistle, groundsel, camelthorn

17. **Perennial plant reproductive capability:** With the exception of large concentrations of salt, there are no environmental factors inhibiting plant growth on this site.