USDA Natural Resources Conservation Service

Ecological site DX035X03A120
Swale

Accessed: 05/21/2025

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.

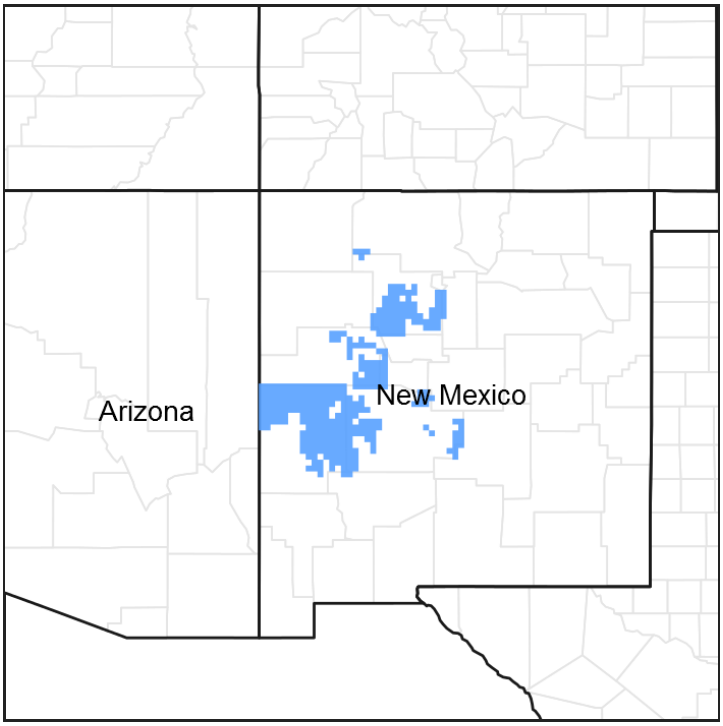


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Sporobolus airoides* (2) *Pascopyrum smithii*

Legacy ID

R035XA120NM

Physiographic features

The topography of this site is level to moderately sloping and usually occurs in a slightly depressed position, which receives runoff from adjacent sites. Slopes range to 10 percent but average less than 5 percent. Elevations range from about 6,000 to just over 7,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Depression (2) Swale (3) Draw
Flooding duration	Extremely brief (0.1 to 4 hours) to very brief (4 to 48 hours)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,829–2,134 m
Slope	0–10%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation varies from about 10 inches to just over 16 inches. Fluctuations ranging from about 5 inches to 25 inches are not uncommon. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. As much as half or more of the annual precipitation can be expected to come during the period of July through September. Thus, fall conditions are often more favorable for good growth of cool-season perennial grasses, shrubs, and forbs than are those of spring.

The average frost-free season is about 120 days and extends from approximately mid-May to early or mid-September. Average annual air temperatures are 50 degrees F or lower and summer maximums rarely exceed 100 degrees F. Winter minimums typically approach or go below zero. Monthly mean temperatures exceed 70 degrees F for the period of July and August.

Rainfall patterns generally favor warm-season perennial vegetation, while the temperature regime tends to favor cool-season vegetation. This creates a somewhat complex community of plants on a given range site which is quite susceptible to disturbance and is at or near its productive potential only when both the natural warm- and cool-season

dominants are present.

Table 3. Representative climatic features

Frost-free period (average)	171 days
Freeze-free period (average)	252 days
Precipitation total (average)	406 mm

Influencing water features

This site is not influenced by water from a wetland or stream.

Soil features

Soils are typically moderately fine- to fine- textured on the surface (or very thin surface loams, sandy loams or sandy clay loams, over fine-textured subsoils), moderately deep to deep with moderately fine- to fine-textured subsoils. Permeability is usually slow, and the available water capacity is moderately high to high. Soil cracking following dry periods provides an opportunity for occasional deep wetting when moisture is received, although runoff in the absence of good vegetative cover can be excessive.
Erosion hazard is high.

Table 4. Representative soil features

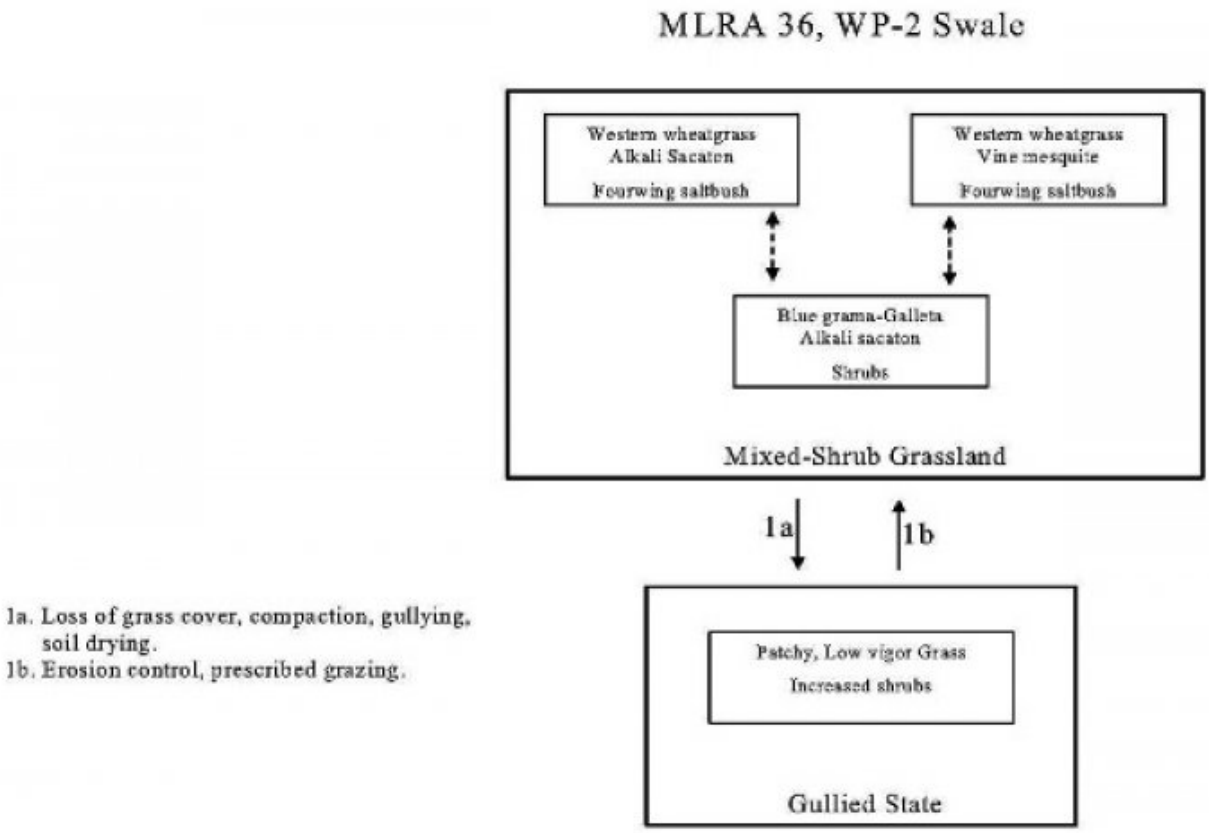
Surface texture	(1) Clay loam (2) Sandy clay loam (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	152 cm
Surface fragment cover <=3"	1–5%
Surface fragment cover >3"	0–3%
Available water capacity (0-101.6cm)	12.7–20.32 cm
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–12

Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	2–13%
Subsurface fragment volume >3" (Depth not specified)	0–3%

Ecological dynamics

Overview
This site occurs as narrow to broad, slightly concave, gently sloping drainageways that often receive additional run-on water from adjacent uplands. Loamy sites are often associated with swale sites. The Swale site stands out in relation to adjacent sites due to extra water received and resulting increased production. This site has the aspect of a mixed-shrub grassland and is characterized by western wheatgrass, alkali sacaton, blue grama, and galleta. Typical shrubs include fourwing saltbush, rabbitbrush, and winterfat. Forbs are naturally variable in kind and amount and make up what is a relatively broad fluctuation in their percentage of the natural plant community. They are evenly distributed, however, and will at times exhibit a significant aspect influence. This site is resistant to state change unless grass cover is reduced to the point that accelerated erosion takes place. A severe loss of grass cover, soil compaction, and gullying may result from continuous heavy grazing and initiate the transition to the Gullied state.

State and transition model



1a. Loss of grass cover, compaction, gullying, soil drying.
1b. Erosion control, prescribed grazing.

State 1
Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

State Containing Historic Plant Community Mixed-Shrub Grassland: The historic plant community is dominated by western wheatgrass. Alkali sacaton is often sub-dominant. On finer textured soils or those sites that receive high runon water amounts, vine mesquite may be the sub-dominant species. Other important grasses that can appear on this site in significant amounts include blue grama, galleta, and spike muhly. Western wheatgrass and vine mesquite typically decrease in response to heavy grazing pressure, and a blue grama-galleta community with alkali sacaton as the sub-dominant may result. The shrub component typically includes scattered fourwing saltbush with some rabbitbrush and winterfat. Broom snakeweed may be more common on sites that receive above average late fall/early spring moisture, especially following a period of drought.1 Diagnosis: Grass and litter cover is high and uniformly distributed, with few large bare areas present. Shrubs are scattered with canopy cover averaging ten percent or less. Evidence of erosion such as pedestalling of grasses, extended water flow patterns, rills and gullies is infrequent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	538	874	1211
Forb	67	110	151
Total	**605**	**984**	**1362**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	20-30%
Forb foliar cover	2-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	15-20%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	0-3%
Bedrock	0%
Water	0%
Bare ground	40-50%

Figure 5. Plant community growth curve (percent production by month). NM0311, R035XA120NM-Swale-HCPC. R035XA120NM-Swale-HCPC.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	8	15	10	9	20	25	8	5	0	0

State 2
Gullied State

Community 2.1
Gullied State

Additional States: Gullied State: The loss of grass cover, decreased available soil moisture, and gullying characterize this site. Patches of low vigor sod-like blue grama are typically present, with galleta occurring as individual plants scattered across the site. Alkali sacaton, if present, is generally found in clumps or tussocks with large interconnected bare areas between plants. On some sites rabbitbrush and broom snakeweed may increase becoming the dominant shrubs. Diagnosis: Large interconnected bare areas are

common. Grass cover is variable ranging from patchy to sparse. Blue grama and galleta are the dominant grass species. Evidence of erosion including rills and gullies is common. Soils may be compacted. Transition to Gullied State (1a): Transitions to the gullied state may occur in response to a loss of grass cover, soil compaction, soil drying, and erosion. The loss of adequate grass cover can decrease infiltration, organic matter, and soil stability, and cause soil drying, increased runoff rates, and erosion.2 Heavy use by livestock during periods when the soils are saturated can cause trampling damage and soil compaction. Soil compaction decreases infiltration and increases runoff and erosion.2 The formation of gullies effectively changes the hydrology and the site dries reinforcing the mechanisms of state change. Transitions to the gullied state appear to be relatively rare. Management differences, soil characteristics, landscape position, and other individual sites characteristics may make them more or less susceptible to this transition. Key indicators of approach to transition: * Reduction in western wheatgrass, vine mesquite, and alkali sacaton cover. * Increase in size and frequency of bare patches. * Increase in cover of blue grama, galleta. * The formation of elongated water flow patterns and rills. Transition back to Mixed Shrub Grassland (1b) The natural hydrology of the site must be restored. Erosion control structures or shaping and filling gullies may be necessary to restore natural run-on flow patterns and allow natural re-vegetation to take place. Prescribed grazing will help restore and maintain adequate grass cover, and permit recovery of function in compacted soils.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				382–601	
	western wheatgrass	PASM	*Pascopyrum smithii*	382–601	–
2				55–164	
	alkali sacaton	SPAI	*Sporobolus airoides*	55–164	–
3				110–164	
	blue grama	BOGR2	*Bouteloua gracilis*	110–164	–
	spike muhly	MUWR	*Muhlenbergia wrightii*	110–164	–
	James' galleta	PLJA	*Pleuraphis jamesii*	110–164	–
4				33–55	
	squirreltail	ELEL5	*Elymus elymoides*	33–55	–
5				55–110	
	sideoats grama	BOCU	*Bouteloua curtipendula*	55–110	–

6				55–110	
	cane bluestem	BOBA3	*Bothriochloa barbinodis*	55–110	–
	common wolfstail	LYPH	*Lycurus phleoides*	55–110	–
	vine mesquite	PAOB	*Panicum obtusum*	55–110	–
	little bluestem	SCSC	*Schizachyrium scoparium*	55–110	–
7				11–55	
	threeawn	ARIST	*Aristida*	11–55	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	11–55	–
	ring muhly	MUTO2	*Muhlenbergia torreyi*	11–55	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	11–55	–
Shrub/Vine					
8				55–110	
	fourwing saltbush	ATCA2	*Atriplex canescens*	55–110	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	55–110	–
9				11–55	
	desert-thorn	LYCIU	*Lycium*	11–55	–
10				11–33	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	11–33	–
Forb					
11				11–110	
	Forb, perennial	2FP	*Forb, perennial*	11–110	–
12				11–55	
	Forb, annual	2FA	*Forb, annual*	11–55	–

Animal community

This range site provides habitats which support a resident animal community that is characterized by prong horn antelope, kit fox, black-tailed jackrabbit, Botta's pocket gopher, silky pocket mouse, sparrow hawk, mourning dove, chipping sparrow, western spadefoot toad, leopard lizard, and prairie rattlesnake. The black-chinned sparrow nests in this rangesite, the chestnut-collared longspur winters and the common raven and prairie falcon hunt over this site.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series----------Hydrologic Group

Recreational uses

This site has potential for hiking, horseback riding, nature observation, photography, picnicking, and camping, although the latter two activities may be limited due to the lack of shade normally found on the site. Occasionally, during the spring and summer when soil moisture conditions are adequate, a colorful array of wild flowers may be seen.

Wood products

This site has little or no significant value for wood products.

Other products

This site is suitable for grazing during all seasons of the year, generally without regard to kind or class of livestock, but is not well suited for continuous year-long grazing if the natural potential vegetation is to be maintained. Under such use, cool-season grasses, such as western wheatgrass and bottlebrush squirreltail, tend to decline or disappear. If use is heavy and prolonged, some of the more palatable warm-season species will also decline. The site, in a typically deteriorated condition, may be characterized by threeawns, ring muhly, and low vigor, sod-like blue grama mixed with heavy stands of rabbitbrush and broom snakeweed. Excessive amounts of bare ground also occur, and the site is highly subject to gullying at this stage. It may also be slow to recover using improved grazing management alone.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month

Similarity Index----------Ac/AUM
100 - 76----------2.9-3.8
75 – 51----------3.7-5.0
50 – 26----------4.7-10.0
25 – 0----------10.0+

Other references

1. McDaniel, K. C., L. A. Torell, and J.W. Bain. 1993. Overstory-understory relationships for broom snakeweed-blue grama grasslands. Journal of Range Management. 46: 506-511.

2. U.S. Department of Agriculture, Natural Resources Conservation Service. 2001. Soil Quality Information Sheets. Rangeland Soil Quality— [Online]. Available: http://soils.usda.gov/sqi/soil_quality/land_management/range.html

Data collection for this site was done in conjunction with the progressive soil surveys within the New Mexico and Arizona Plateaus & Mesas Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: McKinley, Catron, Cibola, Socorro and Sandoval.

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)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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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):**

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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:**

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17. **Perennial plant reproductive capability:**
