

Ecological site R070AY005NM

Shallow Sandstone

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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.

Ecological site concept

This site occurs where soils are shallow (less than 50 centimeters) to lithic contact with sandstone bedrock. Slopes range from 0 to 25 percent. As such, this site correlates to two LRUs of MLRA 70A: The Canadian Plateaus, and the Mesozoic Canyons and Breaks. From an old ESD key for MLRA 70A: 12A. Shallow over sandstone. Slopes usually 5 to 15 percent but may range 0 to 25 percent. The soils are shallow over sandstone with a texture of fine sandy loam, loam, silt loam, or the channery, flaggy, or stony types of these textures. Vegetation includes sideoats grama, little bluestem, blue grama, hairy grama, needle and thread, New Mexico feathergrass, big bluestem, silver bluestem, piñon ricegrass, common wolftail, bottlebrush squirreltail, wild buckwheat, aster, cudweed sagewort, fringed sagewort, oak, skunkbush sumac, mountain mahogany, juniper, and piñon. This site correlates to the Shallow Ecological Site Group (GX070A01XESG02).

Similar sites

GX070A01X013	Lithic Sandstone The Lithic Sandstone site is quite similar, but is only applicable to LRU 70A.1--the Canadian Plateaus.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Bouteloua curtipendula</i> (2) <i>Schizachyrium scoparium</i>

Physiographic features

This site is on gently sloping to moderately steep canyon walls, hillsides, and mesa tops. The landscape is typically a complex of small pockets of soil and sandstone outcrop in the form of ledges and escarpments. Slopes are usually 5 to 15 percent but may range 0 to 25 percent with inclusions of short, steeper slopes. Elevation is 5,500 to 7,500 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mesa (3) Escarpment
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Flooding frequency	None
Ponding frequency	None
Elevation	1,680 – 2,290 m
Slope	0 – 30 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area is classified as “semi-arid continental”.

Precipitation averages 14 to 16 inches. Seventy seven percent of the year’s moisture normally falls during the period of May through October. Practically all of it is brought by brief afternoon and evening thunderstorms. In July and August, normally the wettest months of the year, one can expect about on day in five when rainfall exceeds one-tenth inch. Early spring precipitation in May benefits the cool-season plants. Winter precipitation, supplying 24 percent of the year’s moisture, normally has no more than two days a month with as much as one-tenth inch of moisture. Much of the winter precipitation falls as snow.

Air temperatures vary from a monthly mean of 20 degrees F in January to 69 degrees F in July. Daily high temperatures average in the 80’s and low 90’s during the summer. Winter low temperatures fall below the freezing mark much of the time from November through March with minimum temperatures approaching 25 degrees F below zero. Dates of the last killing frost may vary from May 9th through May 17th, and the first killing frost from September 27th to October 8th. The frost-free season ranges from 141 days to 153 days from early May to early October.

Wind velocities for the area average 10 to 12 miles per hour and prevail from the south and southwest. Generally, March is the windiest month. Strong winds during the spring cause rapid drying of the soil surface.

Nearby mountains to the west intercept much of the precipitation from the Pacific storms coming through this area during the winter. About 70 percent of the 14 to 16 inches of annual precipitation falls in the form of rainfall during the frost-free season. About 40 percent of the annual precipitation benefits cool-season plants, 50 percent benefits warm-season plants, and 10 percent falls during the season of plant dormancy. Relative humidity is moderately low. The sun shines approximately 75 percent of the time.

Climate data was obtained from <http://www.wrcc.sage.dri.edu/summary/climsmnm.html> web site using 50 percent probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

Table 3 Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	170 days
Precipitation total (average)	410 mm

Influencing water features

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

Soil features

Soils are very shallow to shallow. Surface texture are stony loam, gravelly loam, cobbly loam, cindery loam, cobbly fine sandy loam, loam, gravelly silt loam or channery loam. Sandstone bedrock is at depths of less than 20 inches. Permeability is moderate. The available water-holding capacity is low. Effective rooting depth is 6 to 20 inches. Air-water relationship is favorable for plant growth. Rock fragments make up 5 to 35 percent of the soil profile and occupy 0 to 25 percent of the surface.

Minimum and maximum values listed below represent the characteristic soils for this site.

Characteristic soils:

Travessilla

Rizozo

Table 4. Representative soil features

Surface texture	(1) Stony loam (2) Cobbly loam (3) Flaggy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately rapid to rapid
Soil depth	20 – 50 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	10 – 40 %
Available water capacity (0-101.6cm)	2.54 – 10.16 cm
Calcium carbonate equivalent (0-101.6cm)	10 – 20 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified

Soil reaction (1:1 water) (0-101.6cm)	7.2 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	10 – 20 %
Subsurface fragment volume >3" (Depth not specified)	20 – 40 %

Ecological dynamics

This site has the potential to support pinon-juniper stands, and typically does. Fire does kill tree species, and has the potential to temporarily convert the plant community to a grassland dominated by blue grama and little bluestem.

Text from the Grazing Section that is relevant to plant ecology:

Continuous grazing during the grazing season will cause the more desirable forage plants such as sideoats grama, little bluestem, New Mexico feathergrass, big bluestem and pinyon ricegrass to decrease. Species most likely to increase are blue grama, oneseed juniper, ring muhly, oak brush and cholla cactus. As the ecological condition deteriorates, it is accompanied by a sharp increase in juniper, which may give the appearance of dominating the site. Small patches of oak brush will also increase to the point where it may dominate. A late winter, early summer rest is beneficial to shrubby species such as winterfat and mountain mahogany. Rest during April, May and June is beneficial to New Mexico feathergrass, needle and thread and piñon ricegrass. This site provides a large variety of grasses, forbs and shrubs that provide a well-balanced feed and good nutrition for all grazing animals.

State and transition model

Figure 3. Generalized STM for shallow upland sites in 70A. Refer to the interactive STM for more site-specific info.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (t)	Foliar Cover (%)
Grass/Grasslike					
1				291-347	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	287-345	–
2				224-291	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	230-287	–
3				224-291	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	230-287	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	230-287	–
4				56-112	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	57-115	–
	New Mexico feathergrass	HENE5	<i>Hesperostipa neomexicana</i>	57-115	–
5				56-112	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	57-115	–
6				34-56	
	silver bluestem	BOSA	<i>Bothriochloa saccharoides</i>	35-57	–
	pinyon ricegrass	PIFI	<i>Piptochaetium fimbriatum</i>	35-57	–

7				34-56	
	common wolfstail	LYPH	<i>Lycurus phleoides</i>	35-57	–
8				11-56	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	11-57	–
9				34-56	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	35-57	–
Forb					
10				22-56	
	buckwheat	ERIOG	<i>Eriogonum</i>	24-57	–
11				22-56	
	aster	ASTER	<i>Aster</i>	24-57	–
12				22-56	
	Forb, perennial	2FP	<i>Forb, perennial</i>	24-57	–
13				22-56	
	Forb, annual	2FA	<i>Forb, annual</i>	24-57	–
Shrub/Vine					
14				22-56	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	24-57	–
	Pacific alpine wormwood	ARGL9	<i>Artemisia glomerata</i>	24-57	–
16				22-56	
	hairy mountain mahogany	CEMOP	<i>Cercocarpus montanus var. paucidentatus</i>	24-57	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	24-57	–
18				22-56	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	24-57	–
Tree					
15				22-56	
	oak	QUERC	<i>Quercus</i>	24-57	–
	oak	QUERC	<i>Quercus</i>	24-57	–
17				22-56	
	juniper	JUNIP	<i>Juniperus</i>	24-57	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	24-57	–
	juniper	JUNIP	<i>Juniperus</i>	24-57	–
	twoneedle pinyon	PIED	<i>Pinus edulis</i>	24-57	–

Animal community

Habitat for Wildlife: This site provides habitats which support a resident animal community that is characterized by mule deer, coyote, bobcat, bridled weasel, black-tailed jackrabbit, thirteen-lined ground squirrel, rock squirrel, ferruginous hawk, canyon wren, prairie rattlesnake, and the red spotted toad. The great horned owl and the prairie falcon nest in these habitats if suitable rock cliffs occur.

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 Rizozo----- D Travessilla--- D

Recreational uses

This site has fair esthetic appeal and natural beauty. It has a variety of plants that bloom from early spring to late summer. Fair for camping, hiking and picnicking. Hunting is fair for deer and rabbits.

Wood products

Production of juniper and piñon provides limited amounts of firewood and fence posts.

Other products

Grazing: This site can be grazed any season of the year by all classes and kinds of livestock. Because of the slopes and rock outcrops, a younger class of livestock utilize this site best. Browsing animals may be favored because of the site's potential to produce shrubs and forbs. Continuous grazing during the grazing season will cause the more desirable forage plants such as sideoats grama, little bluestem, New Mexico feathergrass, big bluestem, and piñon ricegrass to decrease. Species most likely to increase are blue grama, oneseed juniper, ring muhly, oak brush and cholla cactus. As the ecological condition deteriorates, it is accompanied by a sharp increase in juniper, which may give the appearance of dominating the site. Small patches of oak brush will also increase to the point where it may dominate. A system of deferred grazing that varies the time of grazing and rest in a pasture during successive years is needed to maintain or improve the plant community. A late winter, early summer rest is beneficial to shrubby species such as winterfat and mountain mahogany. Rest during April, May and June is beneficial to New Mexico feathergrass, needle and thread, and piñon ricegrass. This site provides a large variety of grasses, forbs and shrubs that provide a well-balanced feed and good nutrition for all grazing animals.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month Similarity Index-- Ac/AUM 100 - 76----- 3.0 – 3.8 75 – 51----- 3.7 – 4.7 50 – 26----- 4.6 – 12.0 25 – 0----- 12.0+

Contributors

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Approval

Kendra Moseley, 9/12/2023

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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Composition (Indicators 10 and 12) based on	Annual Production
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Indicators

1. **Number and extent of rills:** Minor amount of rilling. Some on steeper slopes.

2. **Presence of water flow patterns:** Some evidence of water flow patterns. Flow patterns one meter caused by overland flow during extreme events.

3. **Number and height of erosional pedestals or terracettes:** Rarely occurring on deeper level site but more evident on steeper shallow less productive parts of site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 30 to 35 percent Bare Ground, 20 to 25 percent Surface Cobble and Stone, Gravel 1 to 5 percent.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Very little litter movement one meter. Litter movement mostly on shallower more steep and less productive sites.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class rating anticipated to be 2-3 inch interspaces at soil surface. These values need verification at reference site.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Travessilla) A1-0 to 4 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10 YR 4/2) when moist; weak fine granular structure; slightly hard when dry, very friable when moist; non-sticky and non-plastic when wet many fine and medium roots common fine pores.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, forb, shrub functional/structural groups and diverse root structure/patterns reduces raindrop impact slows overland flow providing increased time for infiltration to occur. Extended drought reduces short and mid bunchgrasses causing decreased infiltration and increased runoff following intense storm events, especially in bare patch areas if present or exposed sandstone.

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: Warm-season midgrasses

Sub-dominant: Warm-season shortgrasses

Other: Perennial cool-season > Warm-season Tall > shrubs & trees > Perennial forbs.

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Typically minimal. Expect short/mid bunchgrasses mortality/decadence during or following drought.
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14. Average percent litter cover (%) and depth (in): Litter production may be reduced during extended drought or wildfire events to less than 10 percent.
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15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): (Low Production 450 pounds per acre) (Average RV Production pounds per acre) (High Production pounds per acre) Production can be reduced following extended drought or the first growing season following wildfire.
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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: Piñon and oneseed juniper trees are the potential native invaders into this site. Increased trees into this site also greatly affects herbaceous production grasses and forbs.
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17. Perennial plant reproductive capability: All plants should be vigorous, healthy and reproductive depending on disturbances i.e. drought. Plants should have numerous seed heads, vegetative tillers, etc. The only limitations are weather, wildfire, and natural disease that may temporarily reduce reproductive capability.
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