

Ecological site R041XC324AZ

Loamy Upland

12-16" p.z.

Limy

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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): 041X–Madrean Archipelago

AZ 41.3 – Chihuahuan – Sonoran Semidesert Grasslands Elevations range from 3200 to 5000 feet and precipitation ranges from 12 to 16 inches per year. Vegetation includes mesquite, catclaw acacia, netleaf hackberry, palo verde, false mesquite, range ratany, fourwing saltbush, tarbush, littleleaf sumac, sideoats grama, black grama, plains lovegrass, cane beardgrass, tobosa, vine mesquite, threeawns, Arizona cottontop and bush muhly. The soil temperature regime is thermic and the soil moisture regime is ustic aridic. This unit occurs within the Basin and Range Physiographic Province and is characterized by numerous mountain ranges that rise abruptly from broad, plain-like valleys and basins. Igneous and metamorphic rock classes dominate the mountain ranges and sediments filling the basins represent combinations of fluvial, lacustrine, colluvial and alluvial deposits.

Ecological site concept

Loamy Upland, Limy, 12"-16" p.z. ecological site occurs on old fan terraces and alluvial fans with an argillic horizon within 20" of the surface. Soil surface horizons are not calcareous (do not fizz) but plant community is influenced by sub-surface calcium carbonates. Calcic horizons are at moderate depths (20-40").

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This soil is developed on valley plains in alluvium.

Table 2. Representative physiographic features

Landforms	(1) Plain
Flooding frequency	None
Ponding frequency	None

Elevation	1,270 – 1,370 m
Slope	0 %
Aspect	Aspect is not a significant factor

Climatic features

Precipitation in this common resource area ranges from 12-16 inches yearly in the eastern part with elevations from 3600-5000 feet, and 13-17 inches in the western part where elevations are 3300-4500 feet. Winter-Summer rainfall ratios are 40-60% in the west and 30-70% in the east. Summer rains fall July-September, originate in the Gulf of Mexico and are convective, usually brief, intense thunderstorms. Cool season moisture tends to be frontal, originates in the Pacific and Gulf of California, and falls in widespread storms with long duration and low density. Snow rarely lasts more than one day. May and June are the driest months of the year. Humidity is generally very low.

Temperatures are mild. Freezing temperatures are common at night from December-April; however temperatures during the day are frequently above 50 F. Occasionally in December-February, brief 0 F temperatures may be experienced some nights. During June, July and August, some days may exceed 100 F.

Cool season plants start growth in early spring and mature in early summer. Warm season plants take advantage of summer rains and are growing and nutritious July-September. Warm season grasses may remain green throughout the year.

Table 3 Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	
Precipitation total (average)	360 mm

Influencing water features

Soil features

This soil is moderately deep, well drained and has a lime cemented hardpan at about 26 inches. Rooting depth is from about 15 to 30 inches.

This unit is not correlated on any soils in AZ.

Table 4. Representative soil features

Parent material	(1) Alluvium – granite
Surface texture	(1) Sandy loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained

Permeability class	Moderately slow to slow
Soil depth	50 – 100 cm
Available water capacity (0-101.6cm)	6.35 – 12.7 cm

Ecological dynamics

Loamy Upland, Limy, 12"-16" p.z. ecological site is dominated by warm season perennial grasses. All the major perennial grass species on the site are well dispersed throughout the plant community. Perennial forbs and a few species of low shrubs are well represented on the site. The aspect is open grassland. With continuous heavy grazing, palatable perennial grasses like black grama and sideoats grama and plains lovegrass decrease. Increasers under such circumstances include curly mesquite, fluffgrass, threeawns and, in places, false mesquite. With severe deterioration, shrubby species increase to dominate. Loss of porous surface soil causes a reduction in the site's ability to effectively use intense summer rainfall. Natural fire was important in the development of the climax plant community. Stable areas of the site can produce effective herbaceous covers with up to 10% canopy cover of mesquite. In areas where half-shrubs dominate the under-story, the potential production of perennial grass is about the same as the present production of half-shrubs once they are removed from the plant community by fire or brush management.

Catclaw, white-thorn acacia and wait-a-bit mimosa increase in the absence of fire for long periods of time. Native perennial grasses maintain dominance with good grazing management, and with shrub canopy levels less than 5%. Short gramas, fluffgrass and curly mesquite are dominant and the site remains stable as long as their basal cover does not drop below 6 or 7%. Snakeweed and burroweed cycle with climate but never gain dominance. Cholla and prickly pear cycle with climate but never become dominant. Some soil compaction has occurred due to livestock traffic, but hydrologic relationships are not impaired.

Mesquite has increased in the absence of fire for long periods of time to canopy levels of 10%. Lehmann and / or Boer lovegrass have invaded from seeded areas and dominate the under-story. Remnant native perennial grasses diminish over time. Fire may act to increase exotic lovegrass at the expense of native perennial grasses, but may allow native annual species a chance to make seed and persist in the seed-bank. Some soil compaction has occurred due to livestock traffic, but hydrologic relationships have not been impaired.

Mesquite and other large shrubs have increased and are dominant with canopies from 10 to 15%. Native and non-native annual forbs and grasses, both cool and warm season, dominate the understory. Snakeweed and burroweed cycle with climate, but both remain important in the plant community. Native perennial grasses are largely gone, due to the interactions of drought, fire and continuous, heavy grazing. Usually, soil compaction and the loss of herbaceous cover have resulted in sheet and rill erosion on this site. Hydrologic relationships have changed to increase the amount of runoff. As the, coarse textured, soil surface is lost to erosion, the ratio of runoff to infiltration increases.

Mesquite continues to increase up to canopy levels of 25%. Other shrubs and succulents dominate the under-story. Remnant perennial grasses exist only in the protection of cacti and shrubs. Occasional fires may burn in exceptionally wet seasons, but well established mesquite and other shrubs sprout back to a thorn scrub stage. Soil compaction, due to heavy livestock traffic, and lack of herbaceous cover has resulted in sheet, rill and gully erosion. Hydrologic relationships have changed to greatly increase the amount of runoff. As the, coarse textured, soil surface is lost to erosion, the site loses its ability to capture intense summer rainfall, productivity declines, and cool season shrubs and succulents are the only plants able to persist.

Treated/Managed grassland communities are a man made pasture after brush management practices (either chemical or mechanical). The grassland community will either be native perennial grass dominant or, more likely, an introduced African lovegrass monoculture. The grassland community can be created from either of the shrub dominated states. Mesquite and other shrubs are bulldozed; brush is placed in gullies and rills; and perennial grasses are seeded, as necessary. If any non-native lovegrasses are present in the community, they will explode. With good grazing management, hydrologic relationships are good and productivity remains high. Root plowed areas typically eliminate any runoff for long periods of time (25 to 30 years), depending on grazing management. Mesquite and other shrubs will reinvade these areas and maintenance treatments (every 15 years) of herbicides, fire or mechanical methods will be needed to maintain a grassland aspect.

State and transition model

Additional community tables

Contributors

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Approval

Curtis Talbot, 4/12/2021

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	09/20/2026
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:

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

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):

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:

17. Perennial plant reproductive capability:
