Ecological site group ESG11
Malpais

Last updated: 08/17/2022
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Key Characteristics

- Not flooded (hills, convex portions of piedmont slopes, broad basin floors)
- Exposed bedrock present or surface cobbles and stones common
- Rock at lithic contact is basalt, may be a carbonate layer on top of it

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.

Climate

This ecological site group is associated with lava flows and occurs on mesa tops, valley lava flows or hills formed from old volcanic cones. Terrain is frequently interrupted by basalt outcrops, cobbles, stones and occasional boulders. Soils are typically shallow, but may range from 5 in to 20 in deep. Textures are often loamy in texture, frequently with 15-65% rock fragment content (usually gravelly). Texture and presence of carbonates is dependent upon upwind source of eolian material.

Vegetation dynamics

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Major Land Resource Area

MLRA 042B
Southern Rio Grande Rift

Correlated Map Unit Components

21843547, 21843132, 21843551, 21837943, 21837686, 21837799, 21837891, 21837835

Stage

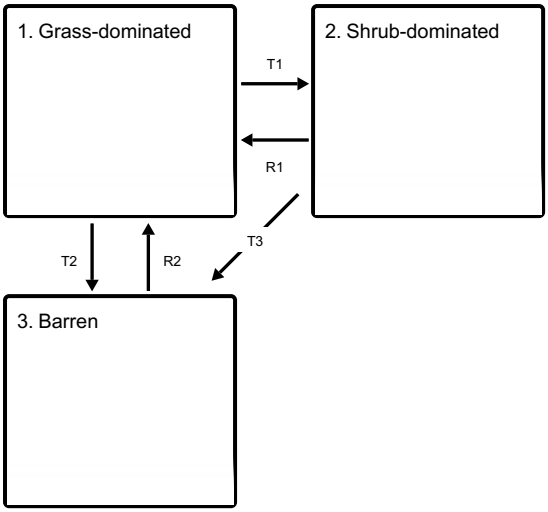
Provisional

Contributors

Curtis Talbot

State and transition model

Ecosystem states



T1 - Shrub invasion, drought, overgrazing

T2 - Overgrazing, erosion

R1 - Shrub removal

T3 - Erosion, drought, shrub removal

R2 - Soil addition, reseeding

State 1
Grass-dominated

Grasses are dominant, but composition and cover varies depending on soil texture, run-in conditions, and disturbance history. Soils between 5” and 20” deep are present. Various shrub species may be present.

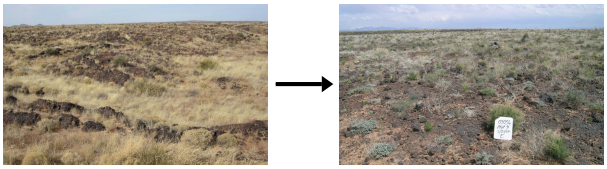
Characteristics and indicators. Grasses dominate areas within malpais sites that have a sufficient depth of soil over the basalt. In some cases, (run-in buffered conditions or “pockets”) soil is restricted to depressions of varying sizes, interspersed with areas of unvegetated basalt outcrops. Shrubs, including Apache plume (*Fallugia paradoxa*), littleleaf sumac (*Rhus microphylla*), saltbush (*Atriplex canescens*), creosotebush (*Larrea tridentata*), and tarbush (*Flourensia cernua*), as well as cacti may occur in pockets and in fissures in the basalt. In other cases, vegetation is distributed more evenly throughout the site and basalt is visible as cobbles, boulders, or small outcrops. The grasses and shrubs in these sites tend to reflect, to varying degrees, the soils that are blown into the basalt from adjacent areas or the weathering of basalt. Sites with finer soils (often weathered from basalt) may harbor tobosa (*Pleuraphis mutica*), vine mesquite (*Panicum obtusum*), cane bluestem (*Bothriochloa barbinodis*), sideoats grama (*Bouteloua curtipendula*), or alkali sacaton (*Sporobolus airoides*) and sites with coarser soils may feature black grama (*Bouteloua eriopoda*), bush muhly (*Muhlenbergia porteri*), threeawns (Aristida spp.) or dropseeds (Sporobolus spp.). Depending on the relative palatabilities and other characteristics of the species present, heavy grazing or drought may result in increases in fluffgrass (*Dasyochloa pulchella*), threeawns (Aristida spp.), snakeweed (Gutierrezia spp.), bare ground and germination of shrub seedlings. In the case of pockets, run-in of water from adjacent outcrops and the tendency of pockets to protect soils, seeds, and plant roots from erosion results in high resilience of the plant community. In the case of flatter areas without such run-in and that are more exposed to wind and water erosion, persistent loss of grasses and soil fertility may occur.

Resilience management. Stocking rates and grazing periods that (1) allow seed-propagated grass plants to flower and produce seeds, and (2) leave black grama stems (stolons) long enough for new plants (ramets) to take root and adequate cover to protect soils through the spring windy season is critical.

State 2
Shrub-dominated

State 3
Barren

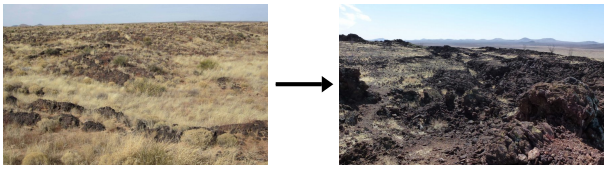
Transition T1
State 1 to 2



Grass-dominated | Shrub-dominated

Shrubs invade and dominate due, in part, to reduced perennial grass cover caused by drought and grazing that allows shrub establishment. Shrubs may also dominate in areas characterized by bedrock fissures, due to their deeper roots exploiting more stable water sources.

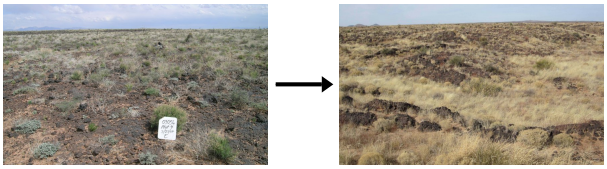
Transition T2
State 1 to 3



Grass-dominated | Barren

Loss of perennial grass cover (due to overgrazing and drought) coupled with increased erosion exposes infertile soil or bedrock.

Restoration pathway R1
State 2 to 1

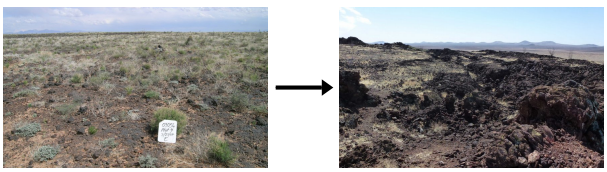


Shrub-dominated | Grass-dominated

Shrub removal on shrub-dominated sites that: 1) occur at the higher end of the LRU elevation range; 2) have one or more persistent perennial grass species (bush muhly, three-awns, dropseeds, black grama) onsite; and 3) have few to no signs of recent soil erosion; have a greater probability of responding favorably and more quickly than do sites at lower elevation with no persistent perennial grass species (or only bush muhly growing in the shrub canopies), and with multiple signs of soil erosion (pedestalled persistent plants, soil lines on rock fragments, rills, soil mounds).

Context dependence. Wide fluctuations in timing and amount of precipitation among years, soil fertility, availability and type of propagation as well as proximity to propagules, will determine likelihood and rate of perennial grass establishment.

Transition T3
State 2 to 3

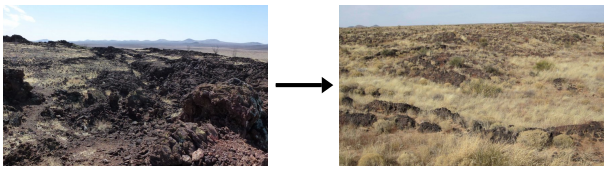


Shrub-dominated | Barren

Multiple years of drought are accompanied by plant decadence and loss, coupled with wind erosion or followed by heavy rains and water erosion. Resultant soil loss leads to infertile soil or exposure of bedrock. Alternatively, shrub removal treatments in shrub-dominated systems with degraded soils result in annual/forb dominated or barren state.

Constraints to recovery. Soil loss or soil infertility. Lack of propagules.

Restoration pathway R2
State 3 to 1



Barren | Grass-dominated

Soil addition, typically over the period of many years from offsite eolian sources, coupled with reseeding, could theoretically restore the plant community.

Context dependence. Wide fluctuations in timing and amount of precipitation among years and soil fertility will determine likelihood and rate of plant establishment.

Citations