Ecological site group DX035X01GESG08
Chinle Valley Gypsum

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Key Characteristics

- Chinle Valley
- Gypsum

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.

Physiography

This group occurs on pediments, structural benches, hills, valleys, alluvial fans, and ridges. Run off is medium to very high. Slopes typically range from 2-70%. Elevations are generally 4300-6800 feet.

Climate

The climate is characterized by hot summers and cool to warm winters. Large fluctuations in daily temperatures are common. Mean annual high temperatures range from 52-59 degrees Fahrenheit and mean annual low temperatures range from 46-52 degrees Fahrenheit. Approximately 70% occurs as rain from March through October. On the average, April, May, and June are the driest months and August, September, and October are the wettest months. Precipitation is extremely variable from month to month and from year to year but averages between 5-10 inches. Much of the precipitation occurs as convection thunderstorms.

Soil features

The soils are shallow to very deep (79") over gypsum, or are gypsum affected throughout. They are well to excessively drained. The dry surface color is typically light reddish brown and soil surface fragments range from 2-30%. The soil temperature and moisture regimes are mesic and typic aridic respectively. Soil textures are variable but are high in gypsum. Water and wind erosion hazard is severe. Runoff is high. Average annual soil loss in potential is approximately 5 tons/acre.

Vegetation dynamics

This group developed under Colorado Plateau ecological conditions and the natural influences of herbivory and climate. This site’s plant species composition is generally dominated by Torrey's jointfir. Blackbrush, Shadscale and Crispleaf buckwheat are commonly associated shrub species. Crispleaf buckwheat can occasionally dominate on steep north exposures. James galleta, Indian ricegrass and other perennial grass production is dependant on weather patterns (summer or winter precipitation) and on soil depth to a gypsic or other restrictive layer. The shallower the soil, the fewer herbaceous species. Blackbrush appears to act as a paleo-endenmic species in this MLRA and may not be able to reestablish itself following mortality.

There is no evidence to indicate that this site historically maintained a short burn frequency. Large gaps between plants (very discontinuous fuels)in relic areas indicate that this site may have historically very rarely burned. Until further research indicates that fire played a significient role in the ecosystem processes of this site, it will not include fire as a disturbance in the reference state. However, due to modern disturbances such as OHV use, the resilience of the historical vegetation may become at risk. These disturbances may result in an opportunity for invasive annuals to enter the system and possibly produce sufficient fuel loads for fire to become a risk. Cheatgrass, red brome, and Russian thistle are most likely to invade this site.

This ecological site has been grazed by domestic livestock since they were first introduced into the area around 1860. It is highly resistant to grazing due to the low palatability of Torrey's jointfir and lack of forage plants. The introduction of domestic livestock and the use of fencing and reliable water sources have therefore only minimally influenced the historic disturbance regime associated with this ecological site.

Improper livestock grazing including, season long grazing and\or heavy stocking rates, may cause this site to depart from the reference plant community. As ecological condition deteriorates, perennial grasses and palatable shrubs may decrease while Woolly locoweed, Desert trumpet, Rubber rabbitbrush, and Broom snakeweed may increase. Improper grazing may also increase the chance of invasion by invasive annuals. On the Colorado Plateau, however, these species are capable of establishing themselves in the abscence of grazing but they rarely increase to a point where they dominate the Torrey jointfir communities.

Management practices that maintain or improve the rangeland vegetation include prescribed grazing and the proper location of water developments. Severe drought may adversely affect the production of the herbaceous perennial vegetation.

Suitability for rangeland seeding is very poor. It is not practical to revegetate large areas of this ecological site because of the sites shallow soil depth, low annual precipitation, and very low available water capacity. Additionally, slpoes can range to 50% making them too steep for reseeding. To control erosion in areas where the need is critical, small areas can be mechanically treated and seeded.

As vegetation communities respond to changes in management or natural influences that move them to different ecological states, a return to previous states may not be possible without major energy inputs. The amount of energy needed to affect vegetative shifts depends on present biotic and abiotic features and the desired results.

The following State and Transition diagram shows some of the most commonly occurring plant communities found on this ecological site. These plant communities may not represent every possibility, but they are the most prevalent and repeatable. As more data are collected, some of these plant communities may be revised or removed, and new ones may be added. This model was developed using range data collected over the last 40 years in MLRA D35 in southeastern Utah. Both ocular and measured data was collected and utilized.

Major Land Resource Area

MLRA 035X
Colorado Plateau

Subclasses

- R035XY106UT–Desert Gypsum Loam (Torrey's Jointfir)
- R035XY126UT–Desert Shallow Gypsum (Torrey's Jointfir)
- R035XY142UT–Desert Very Shallow Gypsum (Torrey's Jointfir)

Correlated Map Unit Components

22397556, 22397555, 22598086, 22601346

Stage

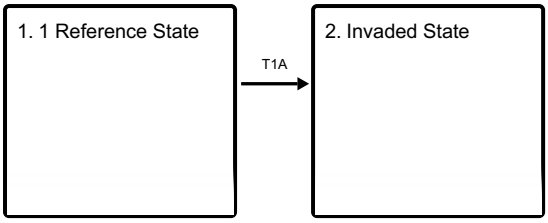
Provisional

Contributors

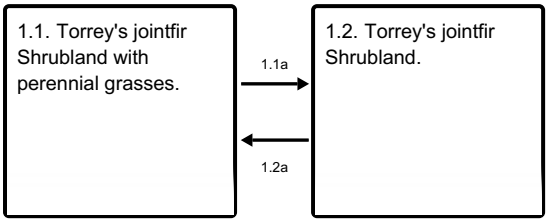
Curtis Talbot

State and transition model

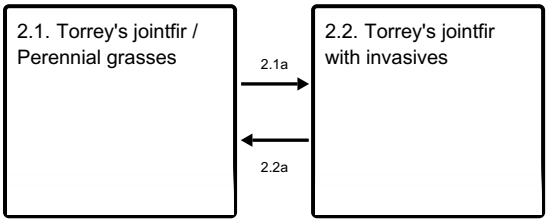
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
1 Reference State

The main driver of plant community change in the reference state is drought. In wet years, this site can support perennial grasses, particularly James' galleta and Indian ricegrass. However, due to harsh gypsum soils and low water-holding capacity, dry years can result in a loss of perennial grasses. The resillience of this site to drought conditions will be lower on shallower soils with lower water holding capacity and/or harsher soil conditions. This state is susceptible to non-native invasive species establishment. Disturbances such as livestock grazing and recreation can increase the likelihood of invasion by promoting germination sites and/or seed sources for non-native species. However, Russian thistle is capable of establishing on this site in the absense of disturbance.

Community 1.1
Torrey's jointfir Shrubland with perennial grasses.

This plant community phase is dominated by Torrey’s jointfir, shadscale, James' galleta, and Indian ricegrass. Galleta is typically the dominant perennial grass species. Other perennial grasses may or may not be present. Other perennial shrubs, and forbs may be present and cover is variable.

Community 1.2
Torrey's jointfir Shrubland.

This plant community phase is dominated by Torrey’s jointfir, and other shrubs. Grasses are limited or absent from the community.

Pathway 1.1a
Community 1.1 to 1.2

This pathway occurs when climatic events, such as drought disfavor the establishment and persistence of perennial grasses. Improper livestock grazing and/or surface disturbance may accelerate this transition.

Pathway 1.2a
Community 1.2 to 1.1

This pathway occurs when weather events, such as years with normal to above average precipitation favor the establishment and persistence of perennial grasses.

State 2
Invaded State

The invaded state resembles the reference state in both community structure and function, but non-native species, notably Russian thistle, are present. As a result, the resilience of the state is somewhat reduced and the possibility of further degradation is greater.

Community 2.1
Torrey's jointfir / Perennial grasses

This plant community is similar to Reference State Community 1.1. except that invasive species are now present. Dominant species are Torrey’s jointfir, shadscale, James' galleta and Indian ricegrass. Galleta is typically the dominant perennial grass species in this plant community phase.

Community 2.2
Torrey's jointfir with invasives

This plant community is similar to Reference State Community 1.2 except that invasive species are now present. Perennial grasses are greatly reduced, and Russian thistle or other invasive annuals may take advantage of the unused resources. This phase may produce annuals, but it is still dominated by Torrey's jointfir and other native shrubs.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs when weather events, such as drought disfavor the establishment and persistence of perennial grasses. Improper livestock grazing and/or surface disturbance may accelerate this transition. Annuals such as Russian thistle, mustards, and cheatgrass may be able to take advantage of these conditions during short term wet spells.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs when weather events, such as years with normal to above average precipitation favor the establishment and persistence of perennial grasses. Carefully managed livestock grazing, where present can accelerate this transition. Annual species such as Russian thistle, mustards, and cheatgrass may also increase during this period--especially if they have banked seed in the soil for many years.

Transition T1A
State 1 to 2

This transition occurs with the establishment of non-native invasive species. Disturbances that promote this transition include season long continuous grazing of perennial grasses, prolonged drought, recreation or other surface disturbances. However, invasive species such as Russian thistle can invade intact perennial plant communities with little to no disturbance. Once invasive plants are found in the plant community, a return to the reference state is not likely.

Citations