Ecological site group DX035X01GESG01
Chinle Valley Sodic Bottoms

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Key Characteristics

- Chinle Valley
- Sodic
- Bottoms

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 site occurs on alluvial valleys, flood plains, stream terraces, near stream channels, and in valley floors that have potential to flood. It is a run-in site that recieves extra moisture from surrounding uplands, and often has a seasonlly high water table within 72 inches of the soil surface. Runoff is very low to high. Slopes typically range from 0-8%, and elevations are generally 3800 to 7300 ft.

Climate

The climate is characterized by very dry and windy climate that has hot summers and cool to warm winters. Large fluctuations in daily temperatures are common. Mean annual high temperatures range from 63-71 degrees Fahrenheit and mean annual low temperatures range from 39-63 degrees Fahrenheit. Approximately 70-75% occurs as rain from March through October. On the average, April, May, and June are the driest months and August through October are the wettest months. Precipitation is extremely variable from month to month and from year to year but averages between 6-16 inches. Much of the summer precipitation occurs as convection thunderstorms. This is a run-in site that receives additional moisture from adjacent sites and occasional flooding.

Soil features

The soils of this site are very deep alluvial deposits, primarily derived form mixed sedimentary materials. The defining characteristics of these soils are a seasonally high water table and high salt content, which results in high production of halophytic plants. Surface and subsurface textures can range from clay loams to sandy loams. Water holding capacity in the upper 40 inches of soil also has a broad range; from 3.7 inches in coarse soils to 7.4 in fine textured soils. These soils are predominantly well-drained, but can be somewhat poorly drained with very slow to moderately rapid permeability. Rock fragments range from 0 to 10 percent on the surface and throughout the profile. The soil temperature regime is mesic and the soil moisture regime can be aridic (torric) or ustic aridic.

Vegetation dynamics

This site was historically dominated by greasewood and a diverse perennial understory, including seepweed, pale evening primrose, Indian ricegrass, Sporobolus spp, and James' galleta. The historic fire return interval is presumed to be about 35-100 years (Anderson 2004). Greasewood and native grasses would have resprouted within one year following fire and maintained dominance of the site. Following a burn, greasewood immediately re-sprouts but grasses dominate the community. After a few years of average precipitation, greasewood regains dominance of the site. There is no evidence that prolonged drought would dramatically alter the species composition of the site in reference condition, although production is expected to be lower. Cheatgrass and Russian thistle commonly establish on this site, and Tamarisk can become dominant when the site occurs near stream and drainage corridors. When the ecological processes are altered due to improper grazing, prolonged drought, altered fire regime, invasive

species dominance, or other disturbances, alternative states can occur that differ from the historic reference state in both plant community structure and ecological function.

As ecological condition deteriorates due to overgrazing, alkali sacaton and coyote willow decrease while salt cedar and rubber rabbitbrush increase to dominate the site.

Major Land Resource Area

MLRA 035X
Colorado Plateau

Subclasses

- DX035X03A118–Bottomland
- R035XB211AZ–Loamy Wash 6-10" p.z. Saline-Sodic
- R035XY003UT–Alkali Bottom (Greasewood)
- R035XY009UT–Alkali Flat (Greasewood)
- R035XY012UT–Semiwet Saline Streambank (Fremont Cottonwood)

Correlated Map Unit Components

22397334, 22397333, 22397436, 22397434, 22397337, 22397336, 22397281, 22397306, 22397248, 22856868, 22999625, 22999671, 22598031, 22598333, 22597877, 22597876, 22598047, 22598367, 22597906, 22597904, 22598219, 22597941, 22601527, 22601529, 22600862, 22600863, 22601098, 22601099

Stage

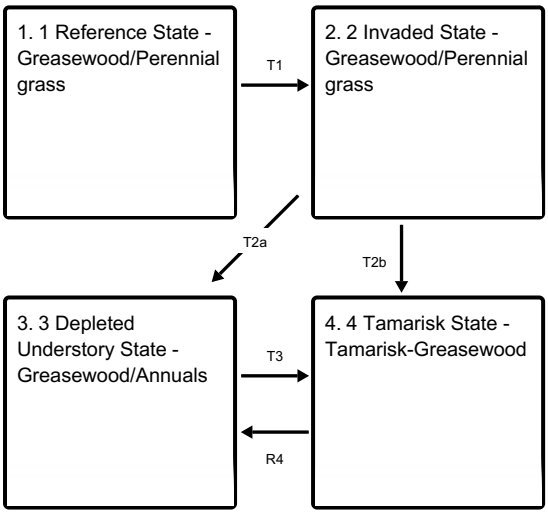
Provisional

Contributors

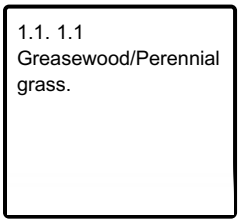
Curtis Talbot

State and transition model

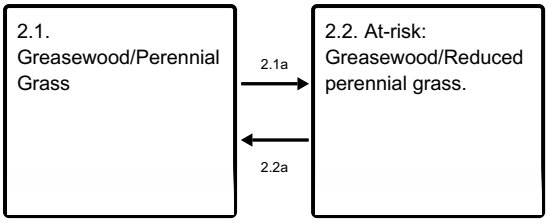
Ecosystem states



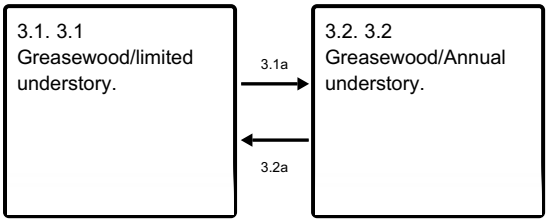
State 1 submodel, plant communities



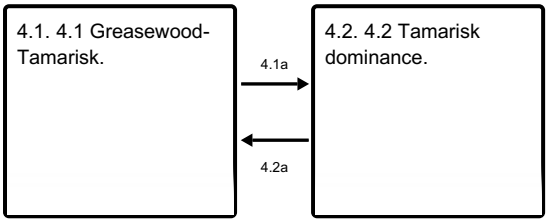
State 2 submodel, plant communities



State 3 submodel, plant communities



State 4 submodel, plant communities



State 1
1 Reference State - Greasewood/Perennial grass

The reference state contains plant communities presumed to occur on the Alkali Bottom site prior to the introduction of non-native plants, livestock grazing, and other modern disturbances. The reference state is generally dominated by greasewood and deep-rooted perennial bunchgrasses. Greasewood harvests salts from the soil profile and concentrates them in its leaves. As a result, salts are deposited on the soil surface when the leaves are dropped or burned, which increases salinity and pH under greasewood plants. Seepweed commonly establishes in the harsh soils under greasewood plants, while perennial grasses and forbs tend to dominate the spaces between shrubs. Invasive plant species, particularly cheatgrass and Russian thistle, can establish on the site given a seed source and germination sites in disturbed soil. These invasive annuals require little or no disturbance to establish. Once invasive plants establish, return to the reference state may not be possible.

Community 1.1
1.1 Greasewood/Perennial grass.

Production is 40-60% perennial grass, 5-15% forbs, and 25-50% shrubs. Biological crust may or may not be present. Community phase 1.1 is characterized by a greasewood canopy with diverse perennial grasses and forbs in the interspaces. The fire-return interval for this phase is 35-100 years, which triggers vigorous re-sprouting of greasewood and perennial grasses within one year following fire. Composition by air-dry weight is 40-60% grasses, 5-15% forbs, and 25-50% shrubs.

State 2
2 Invaded State - Greasewood/Perennial grass

The invaded state is similar to the reference state in composition and ecological function, but allows for non-native species to be present. It also includes an at-risk plant community with reduced perennial grass production. When perennial grasses are losing vigor and the ability to propagate themselves, this state is at risk of transitioning to the depleted understory state, which is not capable of recovering perennial grasses without significant management inputs.

Community 2.1

Greasewood/Perennial Grass

Production is 30-60% perennial grass, 5-15% forbs, and 25-55% shrubs. Non-native species are present, but not dominant. Phase 2.1 is similar to the reference plant community in composition and ecological function, but it allows for the presence of non-native/invasive species. It is dominated by greasewood and perennial grasses. Percent composition by air-dry weight is 30-60% perennial grasses, 5-15% forbs, and 25-55% shrubs.

Community 2.2
At-risk: Greasewood/Reduced perennial grass.

Production is 5-15% perennial and/or annual grasses, 10-40% tamarisk, and 25-50% other shrubs.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs when perennial grasses are reduced in the understory due to excessive grazing during the growing period. Perennial grasses are losing their ability to propagate themselves, and non-native species may co-dominate the understory.

Pathway 2.2a
Community 2.2 to 2.1

Prescribed grazing that provides rest during the growth period for perennial grasses to improve their vigor and reproductive capacity.

State 3
3 Depleted Understory State - Greasewood/Annuals

The depleted understory state occurs when perennial grasses have been lost from the understory. Perennial forbs may also be reduced. Interspaces may be sparsely vegetated or dominated by Russian thistle or other annual invasive species. This state is not as capable of carrying fire due to a reduction in fine fules. As a result, greasewood may continue to increase as the understory continues to be reduced.

Community 3.1
3.1 Greasewood/limited understory.

Production is 5-15% annual grasses and forbs, and 85-95% shrubs. Non-native species dominate the sparse understory. Phase 3.1 is characterized by greasewood dominance and a sparse understory that results from continued overgrazing. Increased size and production of greasewood plants may result in increased soil salinity in surface layers, further reinforcing greaswood dominance on the site.

Community 3.2
3.2 Greasewood/Annual understory.

Production is 15-35% annual grasses and forbs, and 65%-85% shrubs. Non-native species dominate the understory. This phase is dominated by greasewood in the overstory and annual grasses and/or forbs in the understory.

Pathway 3.1a
Community 3.1 to 3.2

Removal of livestock may allow invasive annuals to dominate shrub interspaces.

Pathway 3.2a
Community 3.2 to 3.1

This pathway occurs when livestock use reduces the annual invasive species between shrubs. It may also be

reinforced by an increase in salt deposits on the soil surface from increased greasewood production.

State 4
4 Tamarisk State - Tamarisk-Greasewood

This state primarily occurs on low stream terraces. The stream provides a corridor for tamarisk invasion, which spreads throughout the alkali bottom on low stream terraces, eventually dominating the site.

Community 4.1
4.1 Greasewood-Tamarisk.

Production is 5-15% perennial and/or annual grasses, 10-40% forbs, 15-40% tamarisk, and 15-50% other shrubs. This community phase is characterized by the establishment and persistence of tamarisk. Greasewood is co-dominant with tamarisk in this phase.

Community 4.2
4.2 Tamarisk dominance.

Production is 0-5% perennial and/or annual grasses, 10-40% forbs, 50-95% tamarisk, and 0-20% shrubs. This community phase is characterized by dominance of tamarisk. Greasewood is not dominant in this phase, but may be present as a sub-dominant shrub. Invasive grasses and forbs are often present in this phase.

Pathway 4.1a
Community 4.1 to 4.2

This pathway occurs without disturbance, but may occur more quickly with major disturbances such as fire, heavy livestock grazing, or a combination of the two.

Pathway 4.2a
Community 4.2 to 4.1

This community pathway may occur with tamarisk control efforts, either mechanical or biological. The saltcedar leaf beetle (Diorhabda elongata)can cause enough stress to kill tamarisk in 5-7 years (Richman, Biological Control Field Guide for Utah).

Transition T1
State 1 to 2

Establishment and persistence of non-native species results in a transition from the reference state to the invaded state.

Transition T2a
State 2 to 3

This transition occurs when perennial grasses are reduced by improper grazing to the point that they can no longer self-propagate. Few remnant plants may still persist under shrubs, but re-establishment and dominance by perennial grasses will not occur following a fire, or with the removal of livestock grazing.

Transition T2b
State 2 to 4

This transition only occurs when the site is on low stream terraces. The stream provides a corridor for tamarisk invasion, which spreads to low terraces dominated by greasewood.

Transition T3
State 3 to 4

This transition most commonly occurs when the site is on low stream terraces. The stream provides a corridor for tamarisk invasion, which spreads to greasewood-dominated floodplains.

Restoration pathway R4
State 4 to 3

This community pathway may occur with tamarisk control efforts, either mechanical or biological. The saltcedar leaf beetle (Diorhabda elongata)can cause enough stress to kill tamarisk in 5-7 years (Richman, Biological Control Field Guide for Utah).

Citations