Ecological site group DX035X01GESG11
Chinle Valley Sandy Bottoms Annual

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Key Characteristics

- Chinle Valley
- Sandy
- Bottoms
- Annual streamflow

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 stream terraces, flood plains of valley floors and eolian-mantled high flood plains adjacent to the San Juan River or Chaco River. It receives some additional moisture from rare to frequent flooding and is influenced by a fluctuating water table. It occurs on all exposures. Slopes range from 0 to 1 percent. Elevations range from 3,800 to 6,000 feet. It benefits significantly from occasional over bank flooding and run-in moisture from adjacent uplands.

Climate

Mean annual precipitation varies from 6 to 10 inches. About 60% of this moisture comes as rain from April through October. May and June are the driest months. Most summer rainfall occurs as brief, sometimes heavy, thunderstorms. Most of the moisture from November through March comes as snow. Winds of high velocity during late winter and early spring are common.

Mean temperature for the hottest month, July, is about 83 degrees F. Mean temperature for the coldest month, January, is about 27 degrees F. Extreme temperatures of 104 degrees F and –17 degrees F have been recorded. The frost-free period ranges from 140 to 160 days.

The cool-season plants start growth in March and end with plant maturity and seed dissemination about mid-June. During June, July, August, and September, the warm-season plants make optimum growth taking advantage of the warm temperature and moisture from tropical air out of the Gulf of Mexico. About 40% of the total precipitation is received during these summer months. The other 60% received during the fall-winter-spring months influences cool-season plants.

Soil features

The soils are very deep and well drained to somewhat excessively drained. They are formed in recent alluvium derived from sandstone and quartzite. Surface textures include very fine sandy loam and sand. The subsoil has textures of fine sand, very fine sandy loam, sand, and loamy fine sand. Permeability is moderate to moderately rapid. Available water holding capacity is very low to low. Runoff is negligible to low, and the hazard of water erosion is none to slight. The hazard of soil blowing is severe. The depth to water table is 5 to 6 feet. They are non- to slightly saline (EC 0-8), non sodic (SAR 0-5), and slightly to strongly alkaline (pH 7.4-9.0).

Vegetation dynamics

This group has a plant community made up primarily of mid- and short grasses and some shrubs. In the historic

climax plant community, there is a mixture of cool- and warm-season grasses and shrubs. Plant species most likely to invade or increase on this site when it deteriorates are saltcedar, Russian olive, cheatgrass, Russian thistle, goldenweed, rubber rabbitbrush and annual forbs. Continuous livestock grazing during winter and spring will decrease the cool-season grasses, which are replaced by lower forage value grasses and shrubs.

An ecological site is not a precise assemblage of species for which the proportions are the same from place to place or from year to year. In all plant communities, variability is apparent in productivity and occurrence of individual species. Spatial boundaries of the communities; however, can be recognized by characteristic patterns of species composition, association, and community structure. The historic climax plant community for this ecological site has been described by sampling relict or relatively undisturbed sites and/or reviewing historic records. The historic climax plant community is the plant community that evolved over time with the soil forming process and long term changes in climatic conditions of the area. It is the plant community that was best adapted to the unique combination of environmental factors associated with the site.

Natural disturbances, such as drought, fire, grazing of native fauna, and insects, are inherent in the development and maintenance of these plant communities. The effects of these disturbances are part of the range of characteristics of the ecological site. Fluctuations in plant community structure and function caused by the effects of natural disturbances help establish the boundaries and characteristics of an ecological site. They are accounted for as part of the range of characteristics of the ecological site. Recognizable plant community phases are identified in the reference state of the ecological site. Some sites may have a small range of variation, while others have a large range. Some plant community phases may exist for long periods of time, while others may only occur for a couple of years after a disturbance.

Deterioration of the plant community, hydrology, or soil site stability on an ecological site can result in crossing a threshold or potentially irreversible boundary to another state, or equilibrium. This can occur as a result of the loss of soil surface through erosion, the loss of the stability of the site due to disturbances that cause active erosion on the site, increases in the amounts and/or patterns or runoff from rainstorms, changes in availability of surface and subsurface water, significant changes in plant structural and functional types, or the introduction of non-native species. When these thresholds are crossed, the potential of the ecological site to return to the historic climax plant community can be lost, or restoration will require significant inputs . There may be multiple states possible for an ecological site, determined by the type and or severity of disturbance.

The known states and transition pathways for this ecological site are described in the state and transition model. Within each state, there may be one or more known plant community phases. These community phases describe the different plant community that can be recognized and mapped across this ecological site. The state and transition model is intended to help land users recognize the current plant community on the ecological site, and the management options for improving the plant community to the desired plant community.

Plant production information in this site description is standardized to the annual production on an air-dry weight basis in near normal rainfall years.

Disturbances to this site include: irrigation for farming (resulting in a major drawdown of the water table), unmanaged grazing by various ungulates, natural and artificial changes in the river channel, and drought; and possible increase in salinity due to release of irrigation water. The plant communities described were determined by study of relict areas, if available, or areas protected from excessive disturbances. Trends in plant communities going from unmanaged grazed areas to managed grazed areas, seasonal use areas and historical accounts have also been used.

Major Land Resource Area

MLRA 035X
Colorado Plateau

Subclasses

- R035XB028NM–Sandy Bottom 6-10"
- R035XB216AZ–Sandy Wash 6-10" p.z.
- R035XY015UT–Sandy Bottom

Correlated Map Unit Components

22397210, 22960250, 23000040, 23000049, 23000009, 22598036, 22601086, 22601565

Stage

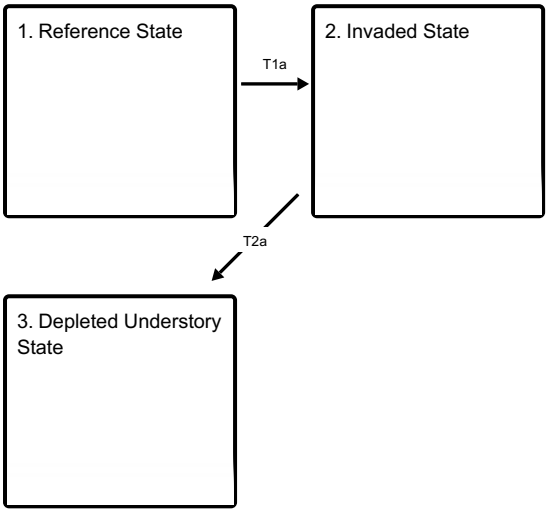
Provisional

Contributors

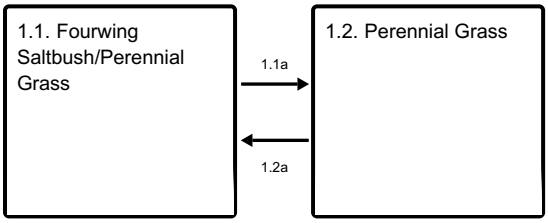
Curtis Talbot

State and transition model

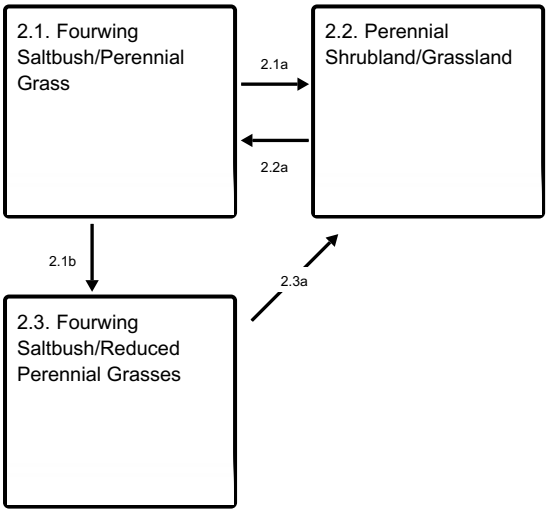
Ecosystem states



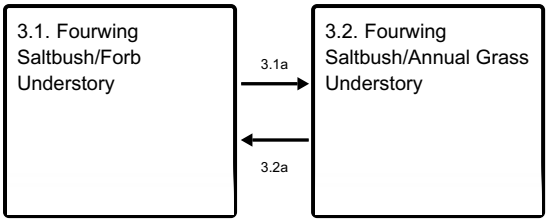
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Reference State

The reference state contains plant communities presumed to occur on the Sandy Bottom site prior to the introduction of non-native plants, livestock grazing, and other modern disturbances. The reference state is generally dominated by fourwing saltbush and deep-rooted perennial bunchgrasses. Plant species are adapted to poorly developed, coarse soils. The reference state does not include any non-native or invasive plant species. Once invasive plants establish, return to the reference state may not be possible.

Community 1.1
Fourwing Saltbush/Perennial Grass

Community phase 1.1 is characterized by a fourwing saltbush 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 fourwing saltbush and perennial grasses within one year following fire. Composition by air-dry weight is 35-60% grasses, 5-15% forbs, and 35-60% shrubs.

Community 1.2
Perennial Grass

Deep-rooted perennial bunchgrasses dominate the site. Fourwing saltbush is not dominant due to persistent heavy browsing over many years, insect herbivory, or prolonged anaerobic soil conditions (flooding). Percent composition by air-dry weight is 65-95% perennial grasses, 5-10% forbs, and 0-30% shrubs.

Pathway 1.1a
Community 1.1 to 1.2

This community pathway occurs when persistent heavy browsing, insect herbivory, or prolonged inundation of fourwing saltbush results in a perennial grass-dominated plant community.

Pathway 1.2a
Community 1.2 to 1.1

This pathway is the natural increase in fourwing saltbush until the shrub again co-dominates the site. It occurs when fourwing saltbush is not subjected to persisitent heavy browse, insect herbivory, or inundation for many years.

State 2
Invaded State

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 incapable of recovering perennial grasses without significant management inputs.

Community 2.1
Fourwing Saltbush/Perennial Grass

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 fourwing saltbush and perennial grasses. Percent composition by air-dry weight is 35-60% perennial grasses, 5-15% forbs, and 35-60% shrubs.

Community 2.2
Perennial Shrubland/Grassland

This plant community is similar to phase 1.2 in structure and function, but it allows for non-native/invasive species to be present. Deep-rooted perennial bunchgrasses dominate the site. Fourwing saltbush is not dominant due to persistent heavy browsing over many years, insect herbivory, or prolonged anaerobic soil conditions (flooding). Percent composition by air-dry weight is 65-95% perennial grasses, 5-10% forbs, and 0-30% shrubs.

Community 2.3
Fourwing Saltbush/Reduced Perennial Grasses

This plant community is at-risk of crossing a threshold into the depleted understory state (state 3). Years of excessive grazing of perennial grasses during growth has favored non-native invasive species, primarily cheatgrass and/or Russian thistle, to co-dominate the understory. Prescribed grazing is required to improve the reproductive capability of perennial grasses and avoid the transition to state 3. Percent composition by air-dry weight is 10-30% perennial grasses and forbs, 10-30% annual grasses and forbs, and 50-70% shrubs.

Pathway 2.1a
Community 2.1 to 2.2

This community pathway occurs when persistent heavy browsing, insect herbivory, or prolonged inundation of fourwing saltbush results in a perennial grass-dominated plant community.

Pathway 2.1b
Community 2.1 to 2.3

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

This pathway is the natural increase in fourwing saltbush until the shrub again co-dominates the site. It occurs when fourwing saltbush is not subjected to persisitent heavy browse, insect herbivory, or inundation for many years.

Pathway 2.3a
Community 2.3 to 2.2

This pathway is facilitated by prescribed grazing that provides rest during the growth period for perennial grasses to improve their vigor and reproductive capacity. This will require at least one above average precipitation year, or many average precipitation years to complete.

State 3
Depleted Understory State

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. Fire in perpetuates this state, since fourwing saltbush and invasive annuals are both capable of recovering quickly following fire.

Community 3.1
Fourwing Saltbush/Forb Understory

This phase occurs when perennial grasses are no longer dominant in the understory and annual forbs dominate the shrub interspaces. Percent composition by air-dry weight is 0-5% grasses, 35-50% annual forbs, and 45-65% shrubs.

Community 3.2
Fourwing Saltbush/Annual Grass Understory

This community occurs when perennial grasses no longer dominate the understory and recent fire and/or above average spring precipitation favors cheatgrass reproduction and establishment.

Pathway 3.1a
Community 3.1 to 3.2

This pathway occurs when above average spring precipitation and below average summer precipitation favors cheatgrass over annual forbs.

Pathway 3.2a
Community 3.2 to 3.1

This pathway may occur in years with low spring moisture and high summer precipitation.

Transition T1a
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.

Citations