USDA Natural Resources
Conservation Service

# Ecological site R036XY266CO
# Salt Meadow

Last updated: 1/16/2025
Accessed: 05/10/2025

## 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.

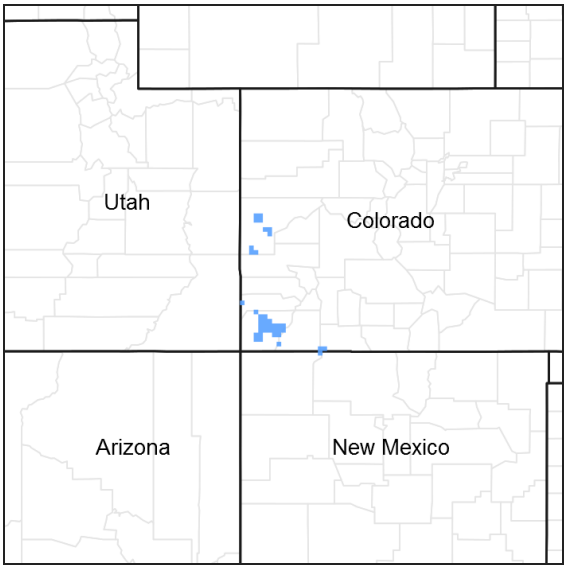


**Figure 1. Mapped extent**

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

## MLRA notes

Major Land Resource Area (MLRA): 036X–Southwestern Plateaus, Mesas, and Foothills

Salt Meadow ecological site is found in drainageways, flood plains and alluvial fans in MLRA 36 (Southwestern Plateaus Mesas and Foothills). The MLRA 36 is illustrated orange color on the map. The ecological site locations as assigned in soil survey map units are shown in pink color.

The site concept was established within the MLRA 36 semidesert and Foothill/Upland regions. This site is a run-in site. This zone is 10 to 16 inches of precipitation and has a mesic temperature regime. This site has bimodal precipitation that is dominated by alkali sacaton, sedges, saltgrass and western wheatgrass.

## Classification relationships

NRCS & BLM: Major Land Resource Area 36, Southwestern Plateaus Mesas and Foothills (United States Department of Agriculture, Natural Resources Conservation Service, 2006).

USFS:
341Ba - Mancos Shale Lowlands-Grand Valley Subsections <341B Northern Canyonlands Section < 341 Intermountain Semi-Desert and Desert (Cleland, et al., 2007).

313Aa - San Juan Basin-Mesa Verde, 313Ab - Canyon of Ancients-Blanding Basin and 313Ac - Monument Upwarp Subsections <313A Grand Canyon Section < 313 Colorado Plateau Semi-desert (Cleland, et al., 2007).

EPA:
20a Monticello-Cortez Uplands, 20b Shale Deserts and Sedimentary Basins, and 20c Semiarid Benchlands and Canyonlands, < 20 Colorado Plateau < 10.l Cold Deserts < 10 North American Deserts (Griffith, 2006).

USGS: Colorado Plateau Province (Canyonlands and Navajo Section)

## Ecological site concept

The 36X Salt Meadow was drafted from the existing Salt Meadows Range Site MLRA 35X, 34X, (SCS, August, 1975). This site was written prior to MLRA 36 being mapped in Colorado and this area was in MLRA 34X was used. This site occurs on drainageways, flood plains and alluvial fans. The soils are deep with loamy textures (clay loam to silty clay loam). Soils are derived from alluvium and/or slope alluvium derived from sandstone and shale, shale, and mixed sources. It is an alkali sacaton-saltgrass community. It has an aridic ustic moisture regime and mesic temperature regime. The effective precipitation ranges from 10 to 16 inches.

## Associated sites

| | |
|---|---|
| R035XY414CO | **Alkali Flat**<br>Alkali Flats - This site is on nearly level and gently sloped terraces, mesa tops, benches and foothill fans. The soils are deep with surface textures of fine sandy loam, loam or clay loam. Subsurface is usually a silty clay loam. The parent materials are alluvium frim sandstone and shales or fine textured eolian materials. Dominant vegetation is alkali sacaton, galleta, squirreltail, greasewood, shadscale, and winterfat. |
| R036XY289CO | **Clayey Foothills**<br>Clayey Foothills occurs on benches, foot-slopes, fans, and valley. Soils are moderately deep to deep and have marine shale as parent materials. The soil textures are clay loam to clay. Dominant plants are Wyoming Big Sagebrush and western wheatgrass. This site has a high potential for shrink swell. |
| R036XY405CO | **Loamy Bottom**<br>Loamy bottom occurs on drainage-ways, floodplains and alluvial fans. This site is in a run-in position on the landscape. Soils are deep. Soil textures are generally loams. Dominant vegetation is basin wildrye, muttongrass, basin big sagebrush, and western wheatgrass |
| R036XY445CO | **Steep Colluvial Slopes**<br>Steep Colluvial Slopes is a very steep (>25% slope) sloped site with very shallow to shallow soils that are clayey in texture. This site is dominated by Utah Juniper and pinyon. This site may have Wyoming big sagebrush in the understory. This site has higher precipitation than Semidesert Loam. The temperature is slightly cooler than the semidesert site. Foothill site will be found at elevations above the semidesert site. The soils are similar in nature. |
| R035XY413CO | **Alkali Bottom**<br>The Alkali Bottom site is found on terraces, drainage-ways and alluvial valley floors. This site is in a run-in position on the landscape. Soils are deep from shale and sandstone. Soils are moderate to strongly alkaline. Surface textures are sandy loam, clay loam or silty clay loam. Subsurface textures are silty clay loam. Dominant plants are alkali sacaton, inland saltgrass, basin wildrye, and greasewood. |
| R035XY262CO | **Salt Flats**<br>Salt Flats - This site is on nearly level flood plains and receives run-in water during periods of runoff. The soils are deep, heavy sandy clay loams to clays. The parent materials are a mix of alkaline marine shales, clay shales and deltaic sediments. Dominant vegetation is basin wild rye and alkali sacaton, greasewood and basin big sagebrush. |

## Similar sites

| | |
|---|---|
| R036XY405CO | **Loamy Bottom**<br>Loamy bottom occurs on drainage-ways, floodplains and alluvial fans. This site is in a run-in position on the landscape. Soils are deep. Soil textures are generally loams. Dominant vegetation is basin wildrye, muttongrass, basin big sagebrush, and western wheatgrass |

| | |
|---|---|
| R036XY038CO | **Wet Meadow**<br>Wet meadow occurs on drainage-ways, swale, floodplains and draws. This site is in a run-in position on the landscape. Soils are deep with a water table. Soil textures are generally sandy loams, loams and clay loams. Dominant vegetation is western wheatgrass, sedges, Nebraska sedge, slender wheatgrass, and basin wildrye. There are no salts present on this site. |

**Table 1. Dominant plant species**

| | |
|---|---|
| Tree | Not specified |
| Shrub | Not specified |
| Herbaceous | (1) *Sporobolus airoides*<br>(2) *Distichlis spicata* |

## Physiographic features

The topography is gently sloping to flat in lowland position subject to a beneficial water table and sometimes overflow water. Elevation ranges from 4800 feet to 6500 feet. This site occupies hills, alluvial fans, draingeways, flood plains, and terraces.

**Table 2. Representative physiographic features**

| | |
|---|---|
| Landforms | (1) Drainageway<br>(2) Alluvial fan<br>(3) Flood plain |
| Flooding duration | Very brief (4 to 48 hours) to brief (2 to 7 days) |
| Flooding frequency | None to occasional |
| Ponding frequency | None |
| Elevation | 4,800–6,500 ft |
| Slope | 0–9% |
| Water table depth | 6–72 in |
| Aspect | Aspect is not a significant factor |

## Climatic features

Average annual precipitation is about 9 to 15 inches. Of this, 40-50% falls as snow, and 40-45% falls between May 1 and September 30. Summer moisture is mostly from thundershowers in late July, August, and September. The driest period is usually from April to early June; and June is normally the driest month. There is fall growth from late summer rains on this site during August and September, usually from the warm season plants. The average annual total snowfall is 38.3 inches. The highest winter snowfall record in this area is 117.5 inches which occurred in 1978-1979. The lowest snowfall record is 3.0 inches during the 1937-1938 winter. This area is located where there is winter precipitation and summer monsoonal rains. Moisture that comes during summer will favor the warm season plants. Mean daily annual air temperature is about 48ºF to 52ºF, averaging about 31ºF for the winter and 60ºF through the growing season, March through October. Summer temperatures of 100ºF or more are not unusual. The frost-free period typically ranges from 110 to 130 days. The last spring frost is the end of April to the end of May and the first fall frost is the first week of October to the end of October. Mean annual temperature ranges from 64 to 37ºF. The coldest winter temperature recorded was -23ºF on February 8, 1933 and the coldest summer temperature recorded was 28ºF on June 3, 1908. The hottest day on record is 110 ºF on June 22, 1905. Wide yearly and seasonal fluctuations are common for this climatic zone. Data taken from Western Regional Climate Center (2017) for Blanding, Utah, Colorado Climate Station. Blanding is on the Western edge of the MLRA. Most Climate station in this LRU (Land Resource Unit) are either on the low end of the range (~12”) or the high end (15 to 16”) of the precipitation range. Blanding and Uravan are the only ones in the middle and Blanding has the longest record.

**Table 3. Representative climatic features**

| | |
|---|---|
| Frost-free period (average) | 123 days |

| | |
|---|---|
| Freeze-free period (average) | 147 days |
| Precipitation total (average) | 14 in |

## Climate stations used

- (1) CORTEZ [USC00051886], Cortez, CO
- (2) NORTHDALE [USC00055970], Dove Creek, CO
- (3) BLANDING [USC00420738], Blanding, UT
- (4) URAVAN [USC00058560], Naturita, CO
- (5) HOVENWEEP NM [USC00424100], Monticello, UT
- (6) LA SAL 1SW [USC00424947], Monticello, UT
- (7) YELLOW JACKET 2 W [USC00059275], Yellow Jacket, CO

## Influencing water features

This site has a water table. The water table ranges from 6 to 72" in depth. It can be associated with running water. The water features have not be classified at this time.

## Soil features

Soils are dark brown to almost white, strongly saline-alkaline. Soils are deep to very deep (60+ inches). These soils are loamy textured. The entire profile is strongly gleyed and is affected by salt and a high water table. Redox features are commonly found in the soils between 4 and 72 inches in depth. These soils have a high pH which is restrictive to kinds, and often amounts, of plant growth. Salt crusts often form on the surface of the soil. The surface layer texture is usually a clay loam or silty clay loam with 28-35% clay. The soil surface horizon ranges from 3 to 8 inches in depth. The subsoils are loamy textured. The subsurface is usually a clay loam or silty clay loam with approximately 28-38% clay. The parent materials are alluvium and/or slope alluvium derived from sandstone and shale, shale, and mixed sources. The soil moisture and temperature regimes are ustic aridic/aridic ustic and mesic respectively.

This ecological site has been used in the following Soil Surveys: CO671 (Cortez Area) CO670 (Ute Mountain Area), and CO668 (La Plata County Area)

Typical soils assigned to this ecological site are:

Fine Loamy

Mikett
Sideslide

**Table 4. Representative soil features**

| | |
|---|---|
| Parent material | (1) Alluvium–sandstone and shale<br>(2) Slope alluvium–shale |
| Surface texture | (1) Clay loam<br>(2) Silty clay loam |
| Family particle size | (1) Loamy |
| Drainage class | Somewhat poorly drained to poorly drained |
| Permeability class | Moderately slow to slow |
| Soil depth | 60 in |
| Surface fragment cover <=3" | 0–5% |
| Surface fragment cover >3" | 0–5% |

| | |
|---|---|
| Available water capacity (0-40in) | 4–7 in |
| Calcium carbonate equivalent (0-40in) | 0–10% |
| Electrical conductivity (0-40in) | 2–8 mmhos/cm |
| Sodium adsorption ratio (0-40in) | 0–15 |
| Subsurface fragment volume <=3" (Depth not specified) | 0–20% |
| Subsurface fragment volume >3" (Depth not specified) | 0–5% |

## Ecological dynamics

MLRA 36 occurs on the higher elevation portion of the Colorado Plateau. The Colorado Plateau is a physiographic province which exists throughout eastern Utah, western Colorado, western New Mexico and northern Arizona. It is characterized by uplifted plateaus, canyons and eroded features. The Colorado Plateau lies south of the Uintah Mountains, north of the Mogollon transition area, west of the Rocky Mountains, and east of the central Utah highlands. The higher elevation portion of the Colorado Plateau which is represented by MLRA 36 is characterize by broken topography, and lack of perennial water sources. This area has a long history of past prehistoric human use for thousands of years. MLRA 36 shows archaeological evidence indicating that pinyon-juniper woodlands where modified by prehistoric humans and not pristine and thus where altered at the time of European settlement (Cartledge & Propper, 1993). This area also included natural influences of herbivory, fire, and climate. This area rarely served as habitat for large herds of native herbivores or large frequent historic fires due to the broken topography. This site is extremely variable and plant community composition will vary with the water fluctuations on this site.

There is a winter-summer bimodal precipitation pattern on this part of the Colorado Plateau. Meaning that this site developed under climatic conditions that include wet, cold winters, and hot, dry summers with summer rains. This area has climatic fluctuations and prolonged droughts are common occurrences. Between an above average year and a drought year, forbs are the most dynamic (Passey et.al. 1982) and can vary up to 4 fold. The precipitation and climate of MLRA 36 are conducive to producing Pinyon/juniper, and sagebrush complexes with high productive sites in the bottoms of the canyons. Predominant species on the Colorado Plateau are Wyoming big sagebrush (*Artemisia tridentata* var. wyomingensis), mountain big sagebrush (*A. tridentata* var. vaseyana), and black sagebrush (*A. nova*), Basin Big Sagebrush (*A. tridentata* var. tridentata), Utah Juniper (Juniperus utahensis) and Pinyon (*Pinus edulis*).

Salt meadows are areas where it floods frequently or has a shallow water table with some wetland properties, but it is not classified as a riparian community. As wettest of species that occur on this site would be classified as facultative species. These usually small scale on the landscape. This site is important part of the landscape as it often serves as habitat for plants, birds and other wildlife.

Two studies were found on saline meadow dynamics. The first one, Brotherson (1987) studied species in a saline meadow adjacent to the Utah Lake in Utah and found 5 vegetation zones all with saltgrass present. He found that the species distribution was a mixed of competition, soil moisture, soil chemistry and texture, soil minerals and soil moisture. Salts were found to be leached during high water times and that the salts “wicked” up during drier time from the deeper soils. Depression areas had increase in soil moisture and consequently decreased salinity. Annuals and introduced species were found on the ridges/mounds with higher salinity and higher pH occurred. The second study showed that succession following lowered water tables caused by groundwater pumping in the Owens Valley of California found alkali meadow (dominated by alkali sacaton and saltgrass) was followed by rubber rabbitbrush-meadow. Therefore, rabbitbrush became more prevalent on the site when the water table dropped. (Johnson, 2000, Hauser, 2006, Elmore et al 2006)

Records of fire with alkali sacaton and saltgrass present are rare. The communities listed do not include salt

meadows for fire regimes. In general, marshes, grasslands and dry meadow sites have a fire frequency of 1 to 10 years while desert grasslands and greasewood sites have a fire return interval of 35 to 100 years (Johnson, 2000, Hauser, 2006). Another source, has greasewood-saltgrass communities with a fire return interval is <200 (Landfire, 2007). Greasewood-saltgrass community and not a meadow community. This site is not described in the fire regime literature that is available at this time. The data available is for general vegetation types in the United States: no specific data for salt meadows on Colorado Plateau at available at this time.

Tamarisk or Russian olive are not common on this site and would be invaders to this site. Russian olive and tamarisk prefer low-laying areas that retain water near the surface or have running water for the majority of the year. These are more commonly found along perennial streams and rivers. Russian olive are more common in Colorado in close proximity to agricultural areas and most likely originate from cultivated plantings.

These sites will need to be updated as more data and knowledge in the future becomes available. Salt Meadow sites in general do not have a lot of data and studies conducted on them in this area. This area has a deficiency in research in general. The majority of the research that has occurred in this area has been in sagebrush and pinyon-juniper ecological sites. Variability in climate, soils, aspect and complex biological processes will cause the plant communities to differ. These factors contributing to annual production variability include wildlife use, drought, and insects. Factors contributing to special variability include soil texture, depth, rock fragments, slope, aspect, and micro-topography. The species lists are representative and not a complete list of all occurring or potentially occurring species on this site. The species lists are not intended to cover the full range of conditions, species and responses of the site. The State & Transition model depicted for this site is based on available research, field observations and interpretations by experts and could change as knowledge increases. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. The following diagram does not necessarily depict all the transitions and states that this site may exhibit, but it does show some of the most common plant communities.

## State and transition model

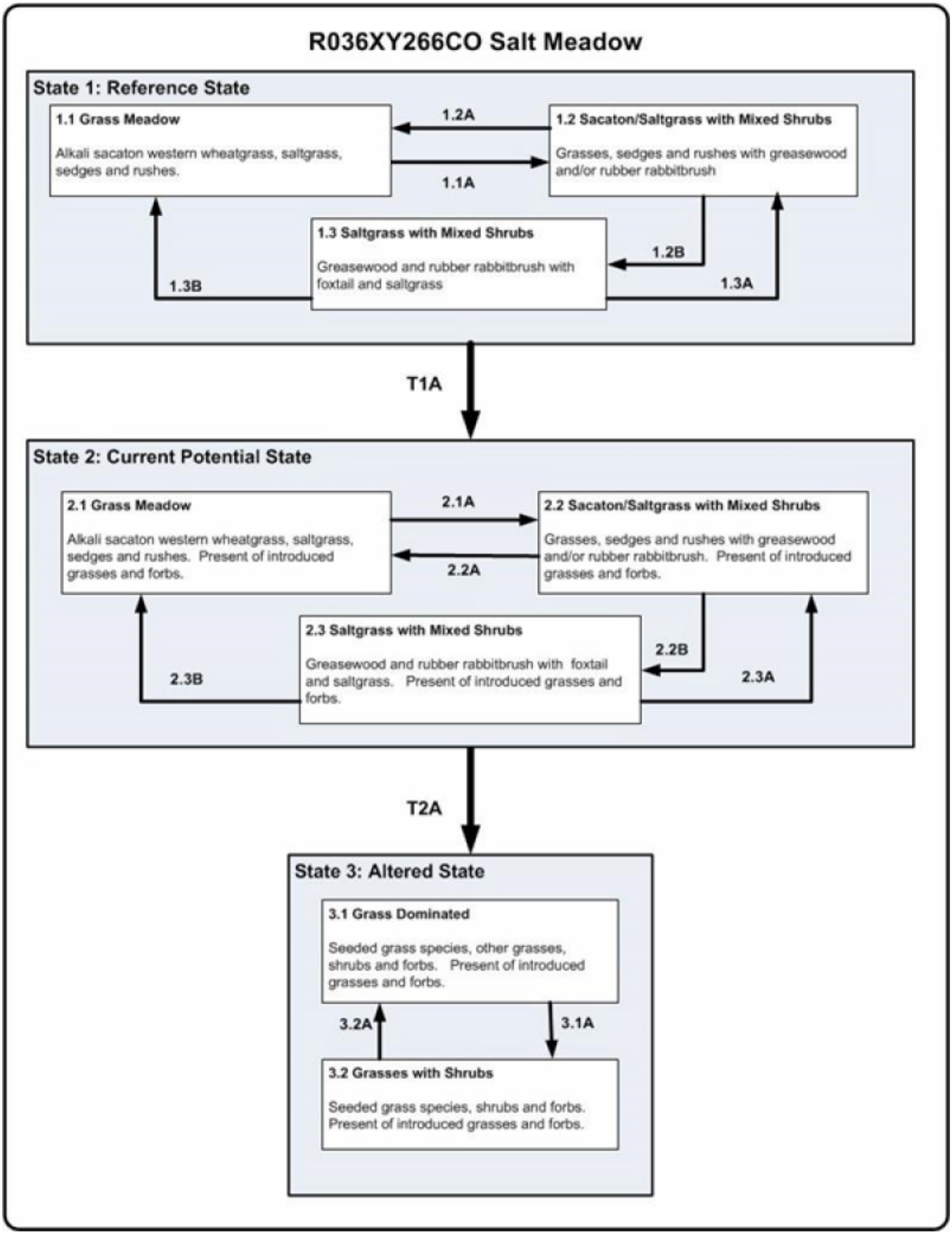
R036XY266CO Salt Meadow
State 1: Reference State
1.1 Grass Meadow
Alkali sacaton western wheatgrass, saltgrass, sedges and rushes.
1.2A
1.1A
1.2 Sacaton/Saltgrass with Mixed Shrubs
Grasses, sedges and rushes with greasewood and/or rubber rabbitbrush
1.3 Saltgrass with Mixed Shrubs
Greasewood and rubber rabbitbrush with foxtail and saltgrass
1.2B
1.3A
1.3B
T1A
State 2: Current Potential State
2.1 Grass Meadow
Alkali sacaton western wheatgrass, saltgrass, sedges and rushes. Present of introduced grasses and forbs.
2.1A
2.2A
2.2 Sacaton/Saltgrass with Mixed Shrubs
Grasses, sedges and rushes with greasewood and/or rubber rabbitbrush. Present of introduced grasses and forbs.
2.3 Saltgrass with Mixed Shrubs
Greasewood and rubber rabbitbrush with foxtail and saltgrass. Present of introduced grasses and forbs.
2.2B
2.3A
2.3B
T2A
State 3: Altered State
3.1 Grass Dominated
Seeded grass species, other grasses, shrubs and forbs. Present of introduced grasses and forbs.
3.2A
3.1A
3.2 Grasses with Shrubs
Seeded grass species, shrubs and forbs. Present of introduced grasses and forbs.

**Figure 6. STM**

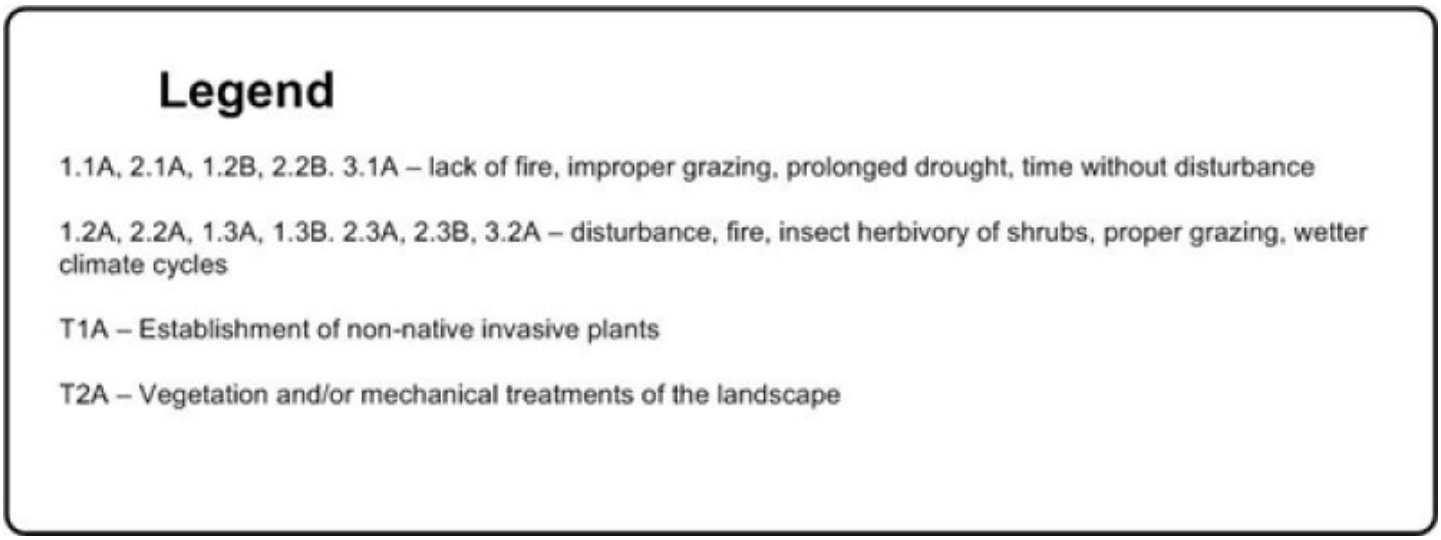


**Figure 7. Legend**

## State 1
## Reference

This state includes the biotic communities that become established on the ecological site under the natural disturbance regime prior to pre-European settlement. The soils are saline and alkaline. Plants that occur on this site salt tolerant. This site supplemental water from intermittent flooding frequency and a water table. Alkali sacaton, saltgrass, alkali grass, western wheatgrass, sedges, and rushes give this site the meadow aspect. A few fourwing saltbush, rabbitbrush and greasewood are scattered over the meadow. Other salt meadow plants include slender wheatgrass, foxtail barley, aster, seepweed (Mojave seablithe) and arrowgrass. Basin wildrye grows on less alkaline places in the site. As this site deteriorates, saltgrass, greasewood, rubber rabitbrush and foxtail will increase. Grasses such as Alkali sacaton, alkaligrass and basin wildrye will decrease. The species composition will vary due to historical use, varying precipitation and water table and fire frequency. Drier sites will have a greater risk of foxtail barley incursion than wetter areas.

### Community 1.1
### Grass Meadow

This plant community is comprised of alkali sacaton, saltgrass, sedges, and rushes with few scattered greasewood, rubber rabbitbrush and/or four-wing saltbush. Areas that get extra water can have increased amounts of Baltic rush. Abundance, and production of herbaceous plants and forb production are dependent on the timing of precipitation, and can vary widely between years.

**Table 5. Annual production by plant type**

| Plant Type | Low (Lb/Acre) | Representative Value (Lb/Acre) | High (Lb/Acre) |
|---|---|---|---|
| Grass/Grasslike | 1325 | 1750 | 2150 |
| Shrub/Vine | 150 | 200 | 250 |
| Forb | 25 | 50 | 100 |
| **Total** | **1500** | **2000** | **2500** |

**Figure 9. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

### Community 1.2
### Sacaton, Saltgrass, and Mixed Shrub

This plant community is a result of time without disturbance, mainly from fire and prolonged drought. Saline and water tolerant plants still make up this community. Saltgrass, western wheatgrass, greasewood and/or rubber rabbitbrush will have increased in abundance and alkali sacaton and basin wildrye will have decreased.

**Figure 10. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

## Community 1.3
## Saltgrass and Mixed Shrub

Saltgrass dominates the plant community with it extensive and dense rhizomatous roots. Also, rubber rabbitbrush and or greasewood has increased. Four-wing saltbush is decreased in abundance and may not be present. Foxtail may replace saltgrass if the grazing pressure is great and there has been a prolonged drought.

**Figure 11. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

## Pathway 1.1A
## Community 1.1 to 1.2

This pathway happens when disturbance such as fire does not occurs within the historical fire regime interval for the site. Improper continuous grazing of perennial grasses will speed up this pathway. Improper grazing will cause saltgrass, greasewood, and rubber rabbitbrush to increase and alkali sacaton, and basin wild rye to decrease. Also, prolonged drought with decreased water tables will progress along this pathway.

## Pathway 1.2A
## Community 1.2 to 1.1

This pathway is caused by naturally occurring fires and/or insect herbivory removes the shrubs. It reverts the system back to a grassland phase. Proper grazing practices which allow for recover of alkali sacaton and other grass species will also help this pathway. Also, wetter climatic cycles will help to decrease shrubs as the shrubs that would occur here naturally don’t like to be in areas of standing water for extended periods of time. For example, Greasewood may be killed by standing water of 40 days or more (Landfire, 2007).

## Pathway 1.2B
## Community 1.2 to 1.3

This pathway happens when fire does not occur within the historical fire regime interval for the site. Improper continuous grazing of perennial grasses will speed up this pathway. Improper grazing will cause saltgrass, foxtail, greasewood, and rubber rabbitbrush to increase and alkali sacaton, and basin wild rye to decrease. Also, prolonged drought with decreased water tables will progress along this pathway.

## Pathway 1.3B
## Community 1.3 to 1.1

This pathway is caused by naturally occurring fires and/or insect herbivory removes the shrubs and possible trees if they have encroached on this site. It reverts the system back to a grassland phase. These events tend to favor grass establishment. Also, brush management and proper grazing can benefit this pathway.

## Pathway 1.3A
## Community 1.3 to 1.2

This transition is caused by naturally occurring fires, herbivory of shrubs, and/or wetter periods that suppresses shrub establishment. These events tend to favor grass establishment. Also, brush management and proper grazing can benefit this pathway.

## State 2
## Current Potential

The current potential state is similar in structure and function to the reference state, however invasive species are present in all community phases. The current potential state is generally dominated by perennial grasses. The current potential state is less resilient than the reference state due to the presence of non-native/invasive species in the plant community. Annual herbaceous weedy plants have increased, but occur in small patches. Invasive species present can include knapweeds, povertyweed, Canada thistle, curly dock, and whitetop (perennial pepperweed).

### Community 2.1
### Grass Meadow

This plant community is comprised of alkali sacaton, saltgrass, sedges, and rushes with few scattered greasewood, rubber rabbitbrush and/or four-wing saltbush. Areas that get extra water can have increased amounts of Baltic rush. Abundance, and production of herbaceous plants and forb production are dependent on the timing of precipitation, and can vary widely between years. Nonnative invasive species, such as povertyweed are present but in insignificant amounts.

**Figure 12. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

### Community 2.2
### Sacaton, Saltgrass, and Mixed Shrub

This plant community is a result of time without disturbance, mainly from fire and prolonged drought. Saline and water tolerant plants still make up this community. Saltgrass, western wheatgrass, greasewood and/or rubber rabbitbrush will have increased in abundance and alkali sacaton and basin wildrye will have decreased. Nonnative invasive species, such as povertyweed are present but in insignificant amounts.

**Figure 13. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

### Community 2.3
### Saltgrass and Mixed Shrub

Saltgrass dominates the plant community with it extensive and dense rhizomatous roots. Also, rubber rabbitbrush and or greasewood has increased. Four-wing saltbush is decreased in abundance and may not be present. Foxtail may replace saltgrass if the grazing pressure is great and there has been a prolonged drought. Nonnative invasive species, such as povertyweed are present but in insignificant amounts.

**Figure 14. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

### Pathway 2.1A

### Community 2.1 to 2.2

This pathway happens when fire does not occur within the historical fire regime interval for the site. Improper continuous grazing of perennial grasses will speed up this pathway. Improper grazing will cause saltgrass, greasewood, and rubber rabbitbrush to increase and alkali sacaton, and basin wild rye to decrease. Also, prolonged drought with decreased water tables will progress along this pathway.

### Pathway 2.2A
### Community 2.2 to 2.1

This pathway is caused by naturally occurring fires and/or insect herbivory removes the shrubs. It reverts the system back to a grassland phase. Proper grazing practices which allow for recover of alkali sacaton and other grass species will also help this pathway. Also, wetter climatic cycles will help to decrease shrubs as the shrubs that would occur here naturally don't like to be in areas of standing water for extended periods of time. For example, Greasewood may be killed by standing water of 40 days or more (Landfire, 2007).

### Pathway 2.2B
### Community 2.2 to 2.3

This pathway happens when fire does not occur within the historical fire regime interval for the site. Improper continuous grazing of perennial grasses will speed up this pathway. Improper grazing will cause saltgrass, foxtail, greasewood, and rubber rabbitbrush to increase and alkali sacaton, and basin wild rye to decrease. Also, prolonged drought with decreased water tables will progress along this pathway.

### Pathway 2.3B
### Community 2.3 to 2.1

This pathway is caused by naturally occurring fires and/or insect herbivory removes the shrubs and possible trees if they have encroached on this site. It reverts the system back to a grassland phase. These events tend to favor grass establishment. Also, brush management and proper grazing can benefit this pathway.

### Pathway 2.3A
### Community 2.3 to 2.2

This transition is caused by naturally occurring fires, herbivory of shrubs, and/or wetter periods that suppresses shrub establishment. These events tend to favor grass establishment. Also, brush management and proper grazing can benefit this pathway.

## State 3
## Altered

This state results from seeding introduced perennial grasses. Native perennial grasses, forbs and shrubs may be included in the seed mix. This state behave similar community dynamics to the current potential state community. Other vegetation treatments may be necessary to get to this state, they include mowing, disking, prescribed burning and other techniques which manipulate the plant community. The seeded state could persist for long periods of time with proper management. Native grasses and forbs may reestablish over time from nearby seed sources.

### Community 3.1
### Grass Dominated

This community is dominated by seeded plants. Shrubs has little to no production in this phase. This site has high production due to the seed grass production. This production typically is higher than the current potential or reference state. This site usually has low species diversity.

**Figure 15. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

### Community 3.2
### Grass and Shrub

This community consists shrubs with grasses. Nonnative invasive species, such as povertyweed and Russian thistle are present but in insignificant amounts.

**Figure 16. Plant community growth curve (percent production by month). CO0102, Semidesert Sites.**

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 20 | 30 | 30 | 10 | | | 5 | 5 | | |

### Pathway 3.1A
### Community 3.1 to 3.2

Time without disturbance and drier climatic conditions that favor establishment of shrubs will assist this pathway. Improper grazing on the grasses species can favor shrub establishment and reduce their competitiveness. Also, several consecutive years of droughts can reduce grass cover.

### Pathway 3.2A
### Community 3.2 to 3.1

This transition is caused by naturally occurring fires, proper grazing of grass and forb species, herbivory of shrubs, and/or wetter periods that suppresses shrub establishment. These events tend to favor grass establishment. Vegetation treatments (mechanically, prescribed fire, chemically, etc.) can also be employed to imitate the natural disturbances regime.

### Transition T1A
### State 1 to 2

The native understory in the reference state has been invade by non-native species. Plant may include povertyweed, Russian thistle, and kochia, and knapweeds. Some invasive plants can become established in undisturbed and healthy native plant communities. Possible events that can cause this transition include improper domestic livestock, severe surface disturbances, fire, and/or extended droughts.

### Transition T2A
### State 2 to 3

This state results from seeding introduced perennial grasses. Native perennial grasses, forbs and shrubs may be included in the seed mix. This state behave similar community dynamics to the current potential state community. Other vegetation treatments may be necessary to get to this state, they include mowing, disking, prescribed burning and other techniques which manipulate the plant community. The seeded state could persist for long periods of time with proper management. Native grasses and forbs may reestablish over time from nearby seed sources.

## Additional community tables

**Table 6. Community 1.1 plant community composition**

| Group | Common Name | Symbol | Scientific Name | Annual Production (Lb/Acre) | Foliar Cover (%) |
|---|---|---|---|---|---|
| **Grass/Grasslike** | | | | | |
| 1 | | | | 1200–1900 | |
| | alkali sacaton | SPAI | *Sporobolus airoides* | 400–700 | – |
| | western wheatgrass | PASM | *Pascopyrum smithii* | 150–250 | – |
| | sedge | CAREX | *Carex* | 150–250 | – |
| | saltgrass | DISP | *Distichlis spicata* | 150–250 | – |
| | foxtail barley | HOJU | *Hordeum jubatum* | 20–150 | – |
| | rush | JUNCU | *Juncus* | 0–150 | – |
| | basin wildrye | LECI4 | *Leymus cinereus* | 20–150 | – |
| | alkaligrass | PUCCI | *Puccinellia* | 0–150 | – |
| | slender wheatgrass | ELTR7 | *Elymus trachycaulus* | 20–100 | – |
| | tufted hairgrass | DECE | *Deschampsia cespitosa* | 0–75 | – |
| | Nebraska sedge | CANE2 | *Carex nebrascensis* | 15–75 | – |
| **Forb** | | | | | |
| 2 | | | | 10–100 | |
| | fourwing saltbush | ATCA2 | *Atriplex canescens* | 20–200 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 20–200 | – |
| | greasewood | SAVE4 | *Sarcobatus vermiculatus* | 20–200 | – |
| | Forb, perennial | 2FP | *Forb, perennial* | 0–100 | – |
| | white sagebrush | ARLU | *Artemisia ludoviciana* | 0–40 | – |
| | aster | ASTER | *Aster* | 0–40 | – |
| | Rocky Mountain beeplant | CLSE | *Cleome serrulata* | 0–40 | – |
| | Canadian horseweed | COCA5 | *Conyza canadensis* | 0–40 | – |
| | American licorice | GLLE3 | *Glycyrrhiza lepidota* | 0–40 | – |
| | povertyweed | IVAX | *Iva axillaris* | 0–40 | – |
| | plantain | PLANT | *Plantago* | 0–40 | – |
| | seaside arrowgrass | TRMA20 | *Triglochin maritima* | 0–40 | – |
| **Shrub/Vine** | | | | | |
| 3 | | | | 200–400 | |
| | Shrub (>.5m) | 2SHRUB | *Shrub (>.5m)* | 0–200 | – |
| | fourwing saltbush | ATCA2 | *Atriplex canescens* | 50–150 | – |
| | rubber rabbitbrush | ERNA10 | *Ericameria nauseosa* | 50–150 | – |
| | greasewood | SAVE4 | *Sarcobatus vermiculatus* | 50–150 | – |
| | skunkbush sumac | RHTR | *Rhus trilobata* | 0–50 | – |
| | yellow rabbitbrush | CHVI8 | *Chrysothamnus viscidiflorus* | 5–50 | – |
| | Mojave seablite | SUMO | *Suaeda moquinii* | 0–40 | – |

## Animal community

From 1975 SCS range site:

GRAZING INTERPRETATIONS:
This site offers a high value rating for cattle, sheep, and horses.

WILDLIFE INTERPRETATIONS:
This site offers a high value rating for bison, elk, and upland game birds. It offers a medium value for antelope, deer, and cottontail. It is of low value for jackrabbits.

## Hydrological functions

Soils were originally assigned to hydrologic soil groups based on measured rainfall, runoff, and infiltrometer data (Musgrave 1955). Since the initial work was done to establish these groupings, assignment of soils to hydrologic soil groups has been based on the judgment of soil scientists. Assignments are made based on comparison of the characteristics of unclassified soil profiles with profiles of soils already placed into hydrologic soil groups. Most of the groupings are based on the premise that soils found within a climatic region that are similar in depth to a restrictive layer or water table, transmission rate of water, texture, structure, and degree of swelling when saturated, will have similar runoff responses. Four (4) Hydrologic Soil Groups are recognized (A-D). For specific definitions of each hydrologic soil group see the National Engineering Handbook, Chapter 7, Part 630 Hydrology, or visit:http://policy.nrcs.usda.gov/OpenNonWebContent.aspx? content=22526.wba

The hydrologic soil groups are based on the following factors:

-intake and transmission of water under the conditions of maximum yearly wetness (thoroughly wet)
- soil not frozen
- bare soil surface
- maximum swelling of expansive clays

The slope of the soil surface is not considered when assigning hydrologic soil groups. In its simplest form, the hydrologic soil group is determined by the water transmitting soil layer with the lowest saturated hydraulic conductivity and depth to any layer that is more or less water impermeable (such as a fragipan or duripan) or depth to a water table (if present) (Caudle, et. al, 2013). The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Soils Hydrologic Group

Fine- Loamy soils

Mikett - C or D
Sideslide - C/D

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms (Soil Survey Staff, 2017).

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly

of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission (Soil Survey Staff, 2017).

## Recreational uses

From 1975 SCS range site:

This site is of medium value for recreation and natural beauty.

## Wood products

None.

## Other information

Plant Preference Table is from 1975 range site.

## Type locality

| Location 1: Montezuma County, CO | |
|---|---|
| General legal description | Type location is along river bottoms of the Dolores and other western Colorado rivers where the water table and saline soils exist. |

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## Contributors

Suzanne Mayne Kinney
Original Author Unknown

## Approval

Kirt Walstad, 1/16/2025

## Acknowledgments

Project Staff:

Suzanne Mayne-Kinney, Ecological Site Specialist, NRCS MLRA, Grand Junction SSO
Chuck Peacock, MLRA Soil Survey Leader, NRCS MLRA Grand Junction SSO

Program Support:

Rachel Murph, NRCS CO State Rangeland Management Specialist, Denver
Scott Woodall, NRCS MLRA Ecological Site Specialist-QA Phoenix, AZ
Eva Muller, Regional Director, Rocky Mountain Regional Soil Survey Office, Bozeman, MT
B.J. Shoup, CO State Soil Scientist, Denver
Eugene Backhaus, CO State Resource Conservationist, Denver

Partners/Contributors:
Those involved in developing earlier versions of this site description include: Herman Garcia, retired CO State RMS and NRCS MLRA Ecological Site Specialist-QA Phoenix, AZ.

--Site Development and Testing Plan--:

Future work to validate and further refine the information in this Provisional Ecological Site Description is necessary. This will include field activities to collect low-, medium-, and high-intensity sampling, soil correlations, and analysis of that data.

Additional information and data is required to refine the Plant Production and Annual Production tables for this ecological site. The extent of MLRA 36 must be further investigated.

Field testing of the information contained in this Provisional ESD is required. As this ESD is moved to the Approved ESD level, reviews from the technical team, quality control, quality assurance, and peers will be conducted.

## 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) | Revised and updated by Suzanne Mayne-Kinney on 08/14/2017. Mayne-Kinney used R034AY266CO reference sheet as that is how the original reference sheet is numbered. The R034AY266CO reference sheet was prepared by C. Holcomb, F. Cummings, and S. Jaouen in 01/20/2005 |

| | |
|---|---|
| Contact for lead author | |
| Date | 08/14/2017 |
| Approved by | Kirt Walstad |
| Approval date | |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** No rills should be present. A very slight amount of rill development may be observed following large storm events or spring runoff periods, but they should heal within the following growing season.

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2. **Presence of water flow patterns:** None to Rare. Any flow patterns present should be sinuous and wind around perennial plant bases. They should be stable with only minor evidence of deposition. This site is periodically inundated with runoff water from adjacent sites. It also acts as a filter and trap sediment.

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3. **Number and height of erosional pedestals or terracettes:** None. A few plants may show very minor pedestalling where they are adjacent to any water flow patterns present, but there will be no exposed roots. Terracettes are not present.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Expect 5-15% bare ground. Extended drought or increased salt concentrations can cause bare ground to increase. White alkali spots are to be expected on this site.

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5. **Number of gullies and erosion associated with gullies:** None. Active gullies should not be present.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. No evidence of soil movement by wind. Wind scoured (blowouts) and depositional areas are not present.

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7. **Amount of litter movement (describe size and distance expected to travel):** Typically slight. The majority of litter accumulates in place at the base of plant canopies. However during major flooding events this site slows water flow and captures litter and sediment.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class rating anticipated to be 3-5 at soil surface.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soils are typically deep and poorly drained with a water table. Surface texture ranges from loam to silty clay loam with a weak fine granular structure to moderate medium platy structure parting to moderate medium granular structure. The A-horizon

ranges from 0-3 inches in depth. Moderate to strongly saline-alkali. Surface salts may be obvious.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Diverse grass, sedge/rush, shrub and forb functional/structural groups and diverse root structure/patterns reduces raindrop impact slows overland flow providing increased time for infiltration to occur. However, the high water table inherent to this site has more effect on infiltration than does plant community. The amount of sodium in the soil can affect infiltration and facilitate water accumulation on the surface.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. This site will normally have textural changes within the profile. These should not be mistaken for compaction layers.

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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: warm season bunchgrass > >

    Sub-dominant: shrubs = sedges/rushes > warm season rhizomatous grass = cool season bunchgrass = cool season rhizomatous grass >

    Other: forbs

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Minimal. Decadence and mortality may occur due to drought and lack of disturbance.

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14. **Average percent litter cover (%) and depth ( in):** 40-50% litter cover and ranges from 0.50 to 1.0 inches in depth. Litter cover declines during and following extended drought.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1500 lbs./ac. low precip years; 2000 lbs./ac. average precip years; 2500 lbs./ac. above average precip years. After extended drought, production may be reduced by 350 – 800 lbs./ac. or more.

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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:** Kochia, povertyweed, Tamarisk, Russian Olive, Russian thistle, tansy mustard and pepperweeds.

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17. **Perennial plant reproductive capability:** The only limitations are weather-related, wildfire, natural disease, inter-species competition, wildlife, and insects that may temporarily reduce reproductive capability.

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