USDA Natural Resources Conservation Service

Ecological site R036XB010NM
Salty Bottomland

Last updated: 12/20/2024
Accessed: 05/21/2025

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.

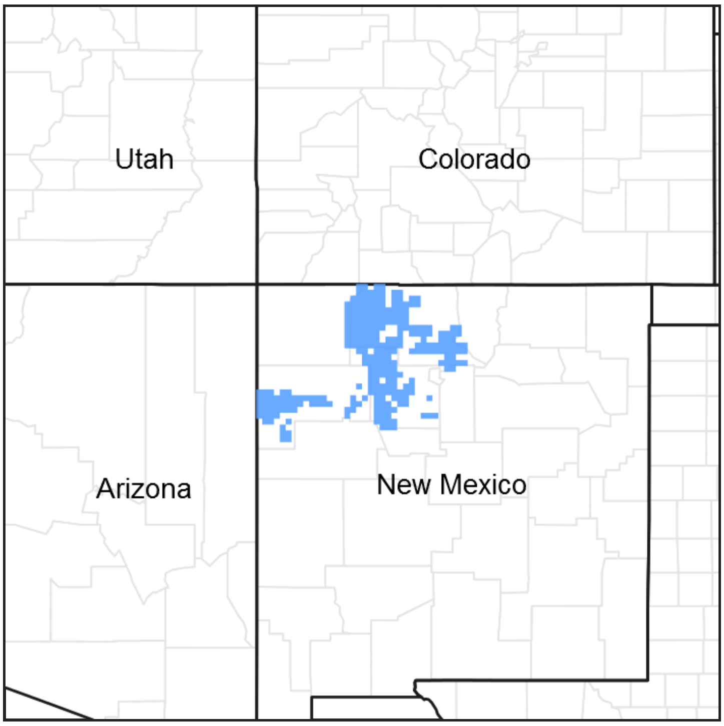

Figure 1. Mapped extent

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

R036XB010NM – Salty Bottomland is an ecological site that is found on floodplains, drainageways, alluvial fan, stream terraces, valley floors, and arroyos in MLRA 36

(Southwestern Plateaus Mesas and Foothills). The southern portion MLRA 36 is illustrated yellow color on the map where this site occurs. The site concept was established in the Southwestern Plateaus. Mesas, and Foothills – Warm Semiarid Mesas and Plateaus LRU (Land Resource Area). This LRU has 10 to 16 inches of precipitation and has a mesic temperature regime. Lower part of MLRA 36 is dominated by summer precipitation for monsoons, unlike the upper part of MLRA 36 which is almost an equal split.

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:
313Bd Chaco Basin High Desert Shrubland and 313Be San Juan Basin North subsections < 313B Navaho Canyonlands Section < 313 Colorado Plateau Semi-Desert (Cleland, et al., 2007).

315Ha Central Rio Grande Intermontane, and 315Hb North Central Rio Grande Intermontane subsections <315H Central Rio Grande Intermontane Section < 315 Southwest Plateau and Plains Dry Steppe and Shrub (Cleland, et al., 2007).

315Ad Chupadera High Plains Grassland subsections <315A Pecos Valley Section < 315 Southwest Plateau and Plains Dry Steppe and Shrub (Cleland, et al., 2007).

331Jb San Luis Hills and 331Jd Southern San Luis Grasslands subsections <331J Northern Rio Grande Basin Section < 331 Great Plains- Palouse Dry Steppe (Cleland, et al., 2007).

M313Bd Manzano Mountains Woodland subsection < Sacramento-Monzano Mountains Section < M313 Arizona-New Mexico Mountains Semi-Desert - Open Woodland - Coniferous Forest - Alpine Meadow

M331Fg Sangre de Cristo Mountains Woodland and M331Fh Sangre de Cristo Mountains Coniferous Forest subsection < M331F Southern Parks and Rocky Mountain Range Section< M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

M331Gk Brazos Uplift and M331Gm Jemez and San Pedro Mountains Coniferous Forest subsections < M331G South Central Highlands Section < M331 Southern Rocky Mountain Steppe - Open Woodland - Coniferous Forest - Alpine Meadow

EPA:
21d Foothill Shrublands and 21f Sedimentary Mid-Elevation Forests < 21 Southern Rockies < 6.2 Western Cordillera < 6 Northwestern Forested Mountains (Griffith, 2006).

20c Semiarid Benchlands and Canyonlands < 20 Colorado Plateaus < 10.1 Cold Deserts < 10 North American Deserts (Griffith, 2006).

22m Albuquerque Basin, 22i San Juan/Chaco Tablelands and Mesas, 22h North Central New Mexico Valleys and Mesas, 22f Taos Plateau, and 22g Rio Grande Floodplain, < 22 Arizona/New Mexico Plateau < 10.1 Cold Deserts < 10 North American Deserts (Griffith, 2006).

USGS:
Colorado Plateau Province (Navajo and Datil Section) Southern Rocky Mountains
Basin and Range (Mexican Highland and Sacramento Section)

Ecological site concept

The 36XB ecological site was drafted from the existing R036XB010NM – Salty Bottomland range site MLRA 36XB (NRCS, 2003). This site occurs floodplains, drainageways, alluvial fan, stream terraces, valley floors, and arroyos. They are affected by sodium. The surface layers range from clay loam, silty clay loam, loam, clay, silt loam, and sandy loam. Surface texture range in clay percent from 15 to 45% clay. The subsoil is usually a clay, silty clay loam or clay loam. The clay percentage at 20 inches in depth ranges from 30 to 50%. The parent material consists of recent alluvium; alluvium derived from sandstone and shale; stream alluvium derived from sandstone and shale; fan and stream alluvium derived from sandstone and shale; and/or stream alluvium derived from gypsum. It has an aridic ustic/ustic arid moisture regime and mesic temperature regime. The effective precipitation ranges from 10 to 16 inches.

Associated sites

F036XA005NM	**Riverine Riparian** Site has a water table at 12-36” Landforms are V-shaped valleys, U-shaped valleys and Overflow Stream (channel).
F036XA001NM	**Pinyon Upland** Pinyon Upland (south of Gallup 13-16) - Slope 1-35%; Soils are very shallow to shallow and non-skeletal; soil surface is loam, channery loam or clay loam. Landforms are broad mesas, cuestas, and hills interspersed with numerous deep canyons and dry washes.
F036XB133NM	**Pinyon-Utah juniper/skunkbush sumac** Pinyon-Juniper/Skunkbush Sumac - Slopes are 1-65%; Soils are moderately deep to deep and skeletal and non-skeletal. Surface texture of gravelly to very gravelly sandy loam, very gravelly loam, loam, para-gravelly-ashy loamy coarse sand, and extremely cobbly coarse sandy loam with a sandy subsoil. Landform is mesas, hills, fan piedmonts, valley sides, plateaus, mountain slopes, structural benches, breaks and ridges.

R036XB002NM	**Clayey** Clayey - Slopes are 0-15%; Soils are moderately deep to deep; soil surface loam, clay loam, silty clay loam, and silty clay over clayey subsoil with textures of clay loam, clay to silty clay loam or silty clay. Landforms are stream terraces, valley floors, fan remnants, alluvial fans, dipslopes on cuestas, mesas, hills, and valley floors.
R036XB006NM	**Loamy** Loamy - Slopes are 1-15%; Soils are moderately deep to deep; soil surface range from loam, gravelly loam, loamy fine sand, fine sandy loam, sandy loam, silt loam and clay loam. Subsoil is loamy and range from loam to clay loam. Landforms are mesas, plateaus, fan remnant, terraces, dipslopes on cuestas, and broad upland valley sides.
R036XB008NM	**Meadow** Meadow - Water table 28-72” in depth; slopes 1-5%; soils are deep, Surface textures are silty clay loam, and clay loam with a subsoil of stratified loams, silt loams, silty clay loams, clay loams, very gravelly sand and gravelly sand. Landform is nearly level to gently sloping floodplains.
R036XB009NM	**Salt Meadow** Water table 36-72” in depth; slopes are 1-5%; soils are deep, Surface textures are loam, fine sandy loam, clay loam, silty clay loam with a subsoil of clay or clay loam. Landform is nearly level to gently sloping floodplains. This site is dependent on sub-irrigation and overflow for its moist condition. This site is affected by sodium.
R036XB010NM	**Salty Bottomland** Water table 42-72” in depth; soils are deep, high in sodium, soils are gravelly to skeletal (15-35% rock fragments). Surface textures are loam, fine sandy loam, clay loam and silty clay loam with a subsoil of clay or clay loam. Landform is floodplain.
R036XB011NM	**Sandy** Sandy - Slopes are 1-15%; soils are deep to very deep; Surface textures are loamy sand, gravelly loamy sand, loamy fine sand, fine sandy loam and sandy loam with sandy subsoil. Landforms are nearly level to gently sloping landscapes on dunes, fan remnant and alluvial fans.
R036XB017NM	**Swale** This site is enhanced by runoff during periods of high runoff (intermittent). The water table depth is greater than 6 ft. Soils are deep to very deep soils that have surface textures of loams, silt loams to clays with loamy subsoil. Landforms are broad valley bottoms, floodplains, and in depressions.

Similar sites

R036XB009NM	**Salt Meadow** Water table 36-72” in depth; slopes are 1-5%; soils are deep, Surface textures are loam, fine sandy loam, clay loam, silty clay loam with a subsoil of clay or clay loam. Landform is nearly level to gently sloping floodplains. This site is dependent on sub-irrigation and overflow for its moist condition. This site is affected by sodium.
R036XB008NM	**Meadow** Meadow - Water table 28-72” in depth; slopes 1-5%; soils are deep, Surface textures are silty clay loam, and clay loam with a subsoil of stratified loams, silt loams, silty clay loams, clay loams, very gravelly sand and gravelly sand. Landform is nearly level to gently sloping floodplains.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Sarcobatus vermiculatus* (2) *Atriplex confertifolia*
Herbaceous	(1) *Sporobolus airoides* (2) *Achnatherum hymenoides*

Physiographic features

This alluvial floodplain site receives additional moisture from adjacent uplands. Landforms this site is found on include: floodplains, drainageways, alluvial fan, stream terraces, valley floors, and arroyos. It is dissected by shallow rivulets, which will develop into deep, vertical-walled gullies when the vegetation has deteriorated. Slopes range from 1 to 8 percent. Elevation ranges from 5,700 to 7,200 feet above sea level.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Drainageway (3) Alluvial fan
Flooding duration	Extremely brief (0.1 to 4 hours) to brief (2 to 7 days)
Flooding frequency	None to occasional
Ponding duration	Very brief (4 to 48 hours)
Ponding frequency	None to rare
Elevation	5,700–7,200 ft
Slope	0–5%
Water table depth	42–72 in
Aspect	Aspect is not a significant factor

Climatic features

This site has a semi-arid continental climate. There are distinct seasonal temperature variations. Mean annual precipitation varies from 10 to 16 inches. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. Wide yearly and seasonal fluctuations are common for this climatic zone which can range from 5 to 25 inches. Of this, approximately 25-35% falls as snow, and 65-75% falls as rain between April 1 and November 1. The growing season is April through September. As much as half or more of the annual precipitation can be expected to come during the period of July through September. August is typically the wettest month of the year. The driest period is usually from November to April; and February is normally the driest month. During July, August, and September, 4 to 6 inches of precipitation influence the presence and production of warm-season plants. Fall and spring moisture is conducive to the growth of cool-season herbaceous plants and maximum shrub growth. Growth usually begins in March and ends with plant maturity and seed dissemination when the moisture deficiency and warmer temperatures occur in early June. There is also a period of growth in the fall. Summer precipitation is characterized by brief thunderstorms, normally occurring in the afternoon and evening. Winter moisture usually occurs as snow, which seldom lies on the ground for more than a few days. The average annual total snowfall is 29.1 inches. The snow depth usually ranges from 0 to 1 inches during the winter months. The highest snowfall record is 57.1 inches during the 1993-1994 winter. The frost- free period typically ranges from 110 to 145 days and the freeze free period is from 140 to 170 days. The last spring freeze is the middle of April to the first week of May. The first fall freeze is the middle of October to the first week of November. Mean daily annual air temperature is about 29ºF to 69ºF, averaging about 37ºF for the winter and 67ºF in the summer. The coldest winter temperature recorded was -20ºF on January 6, 1971 and the warmest winter temperature recorded was 70ºF on February 28, 1965. The coldest summer temperature recorded was 26ºF on June 1, 1980. The hottest day on record is 100ºF on July 9, 2003 and June 21, 1968. Data taken from Western Regional Climate Center (2017) for El Rito, New Mexico Climate Station.

Table 3. Representative climatic features

Frost-free period (average)	126 days
Freeze-free period (average)	145 days
Precipitation total (average)	13 in

Climate stations used

- (1) ABIQUIU DAM [USC00290041], Gallina, NM
- (2) LYBROOK [USC00295290], Dulce, NM
- (3) COCHITI DAM [USC00291982], Pena Blanca, NM
- (4) EL RITO [USC00292820], El Rito, NM

- (5) CUBA [USC00292241], Cuba, NM
- (6) NAVAJO DAM [USC00296061], Navajo Dam, NM
- (7) SANTA FE 2 [USC00298085], Santa Fe, NM

Influencing water features

This site may be influenced by water from a wetland or stream.

Soil features

The soils generally are deep and well drained. They are affected by sodium. The surface layers range from clay loam, silty clay loam, loam, clay, silt loam, and sandy loam. Surface texture range in clay percent from 15 to 45% clay. The subsoil is usually a clay, silty clay loam or clay loam. The clay percentage at 20 inches in depth ranges from 30 to 50%. The parent material consists of recent alluvium; alluvium derived from sandstone and shale; stream alluvium derived from sandstone and shale; fan and stream alluvium derived from sandstone and shale; and/or stream alluvium derived from gypsum. Water intake rate is slow to very slow. Plant roots may be restricted by the sodium content of the soil.

This site is found in NM606, NM656, NM650, NM678, NM698, NM672, and NM692 soil surveys. This ecological site has been correlated to the following soils with the listed particle control sections:

Fine-Loamy:

Breadsprings, San Mateo, Werlog

Fine-Silty:

Billings
Fine:
Alkali Alluvial Land, Cementlake, Christianburg, Conchovar, Galisteo, Gobernador, Heshotauthla, Nahodish. Navajo, Rehobeth, Sparank, Sparham

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale (2) Alluvium–rock gypsum
Surface texture	(1) Silt loam (2) Silty clay loam (3) Clay loam
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow

Soil depth	60–0 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	3.1–7.4 in
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–45
Soil reaction (1:1 water) (0-40in)	7.3–9.6
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–20%

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 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.

The lower part MLRA 36 developed under climatic conditions that include hot, dry summers with summer rains showers and little to no snow with the mild winter temperatures. 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 component of this community and can vary up to 4 fold (Passey et.al. 1982). 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), one-seed juniper (*Juniperus monosperma*), and two-needle pinyon (*Pinus edulis*). One-seed juniper has the capability to discontinue active growth when moisture is limited but can resume growth when moisture availability improves. This growth pattern may represent an important adaptation allowing them to survive on very arid sites. It is possible that small trees may be killed by drought; mature one-seed junipers are resilient to drought, especially in comparison to two-needle pinyon (Johnsen, 1962).

Salt meadows and bottom 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 and bottomland 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

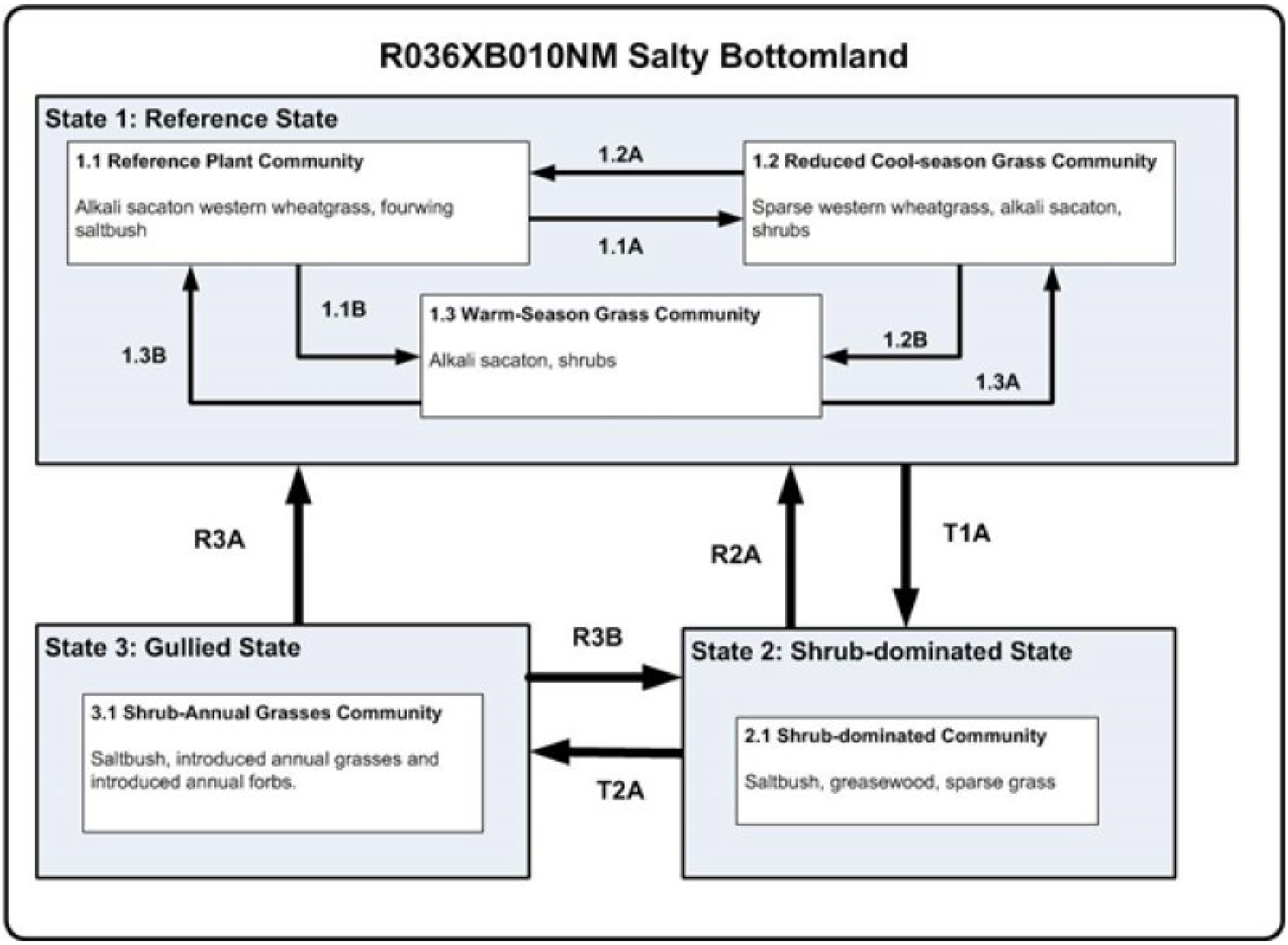

Figure 6. STM

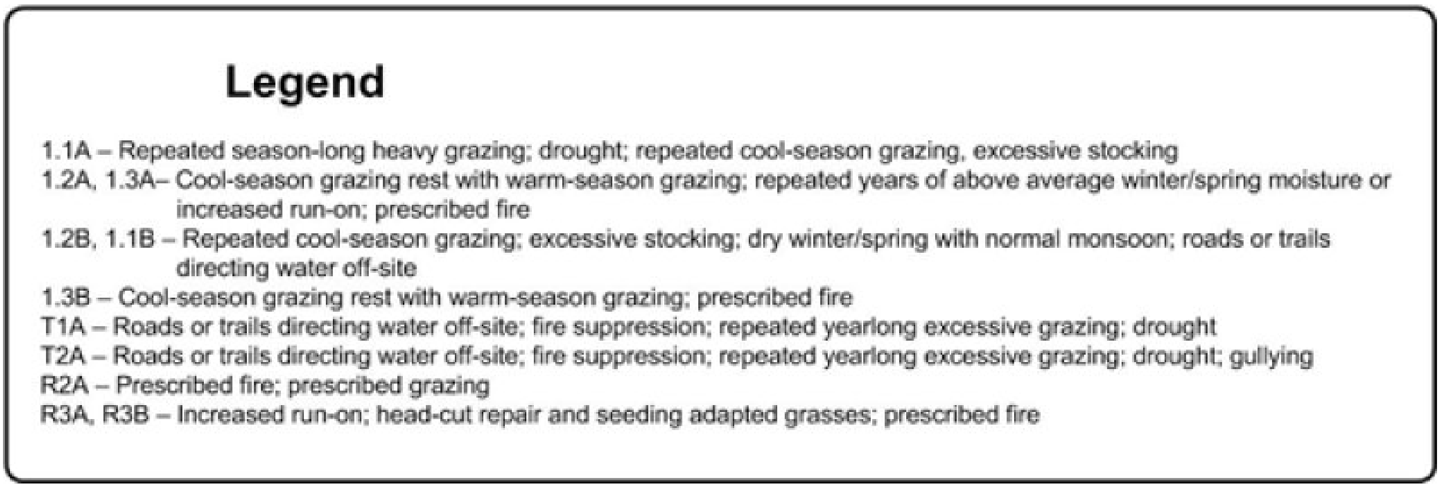

Figure 7. Legend

State 1
Reference

This site occurs on alluvial floodplains and benefits from occasional deep wetting due to additional run-on water received from adjacent uplands. The soils are deep, well drained, and salt affected. This site may intergrade with Salt Meadow sites. The reference plant community of the Salty Bottomland site is a grass-shrub mix characterized by alkali sacaton, western wheatgrass, fourwing saltbush and greasewood. Perennial forbs are typically a minor component of the plant community. In years that receive above-average spring precipitation, annual forbs and grasses may occur in high relative abundance. Soil drying due to blocked or redirected water flow may favor deeper-rooted shrubs and initiate the transition to the Shrub-dominated State. Loss of grass cover, resource competition by shrubs, and soil sealing may also facilitate the transition to the Shrub-Dominated State. The continued loss of grass cover in conjunction with soil sealing, increased overland flow, and resulting erosion may initiate the transition to the Gullied State. This site is a shrub-grass mixture characterized by mid-grasses, alkali sacaton and western wheatgrass. Inland saltgrass withstands a shallower water table, ponding, and high salt concentration better than alkali sacaton. The characteristic shrubs are black greasewood and fourwing saltbush. Big sagebrush occurs where this site is less salty and is gradually replaced by shadscale as salt increases. Perennial forbs are a minor component of the plant community. Annual forbs and grasses occur in relative abundance during the spring in years which have above average growing conditions. When the potential plant community deteriorates, there is a marked increase in relative abundance of shrubs, cacti, and perennial and annual forbs. With severe vegetative deterioration, the site will consist predominantly of shrubs but can also be dominated by greasewood, sagebrush, annual forbs, and annual grasses, with lesser amounts of perennial grasses and large areas of unprotected soils. The reference state is maintained by recurring fire (fire disclimax).

Community 1.1
Alkali Sacaton and Western Wheatgrass

The reference plant community is dominated by alkali sacaton with subdominant western wheatgrass. Other important grasses that appear on this site include bottlebrush squirreltail, galleta, blue grama, and Indian ricegrass. Inland saltgrass is often found in patches, typically in depressions that receive additional water. Fourwing saltbush is the dominant shrub. Other shrubs such as greasewood, big sagebrush, and other saltbush species may be common. Continuous heavy grazing typically results in a decrease of the cool-season grasses such as western wheatgrass, Indian ricegrass, and bottlebrush squirreltail. A community of alkali sacaton and galleta may result. On heavy-textured clay soils, a sparse, less-vigorous community of western wheatgrass and alkali sacaton may persist. Diagnosis: Grass and litter cover is uniform with few large bare areas present. Shrubs are common with canopy cover averaging fifteen percent. Evidence of erosion such as pedestalling of grasses, rills and gullies is infrequent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	390	700	975
Shrub/Vine	150	250	375
Forb	60	100	150
Total	**600**	**1050**	**1500**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	10-20%
Grass/grasslike foliar cover	15-25%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	20-30%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	30-40%

Figure 9. Plant community growth curve (percent production by month). NM0010, R036XB010NM Salty Bottomland HCPC. R036XB010NM Salty Bottomland HCPC A mid-grassland shrub mixture with a minor forb component..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	5	10	10	25	30	12	5	0	0

Community 1.2
Cool Season Grass

This community is characterized by alkali sacaton, Indian ricegrass and squirreltail, saltbush, greasewood and sparse western wheatgrass. This plant community is a grass-shrub mix.

Community 1.3
Warm Season Grass

This plant community is a grass-shrub mix. The dominant plants are western wheategrass, galleta, blue grama and alkali sacaton.

Pathway 1.1A
Community 1.1 to 1.2

This pathway can be caused by repeated season-long heavy grazing; drought; repeated cool-season grazing, and/or excessive stocking.

Pathway 1.1B
Community 1.1 to 1.3

This pathway can be caused by repeated cool-season grazing; excessive stocking; dry winter/spring with normal monsoon; roads or trails directing water off-site.

Pathway 1.2A
Community 1.2 to 1.1

This pathway may be cause by cool-season grazing rest with warm-season grazing; repeated years of above average winter/spring moisture or increased run-on; and/or prescribed fire.

Pathway 1.2B
Community 1.2 to 1.3

This pathway may be cause by repeated cool-season grazing; excessive stocking; dry winter/spring with normal monsoon; and/or roads or trails directing water off-site

Pathway 1.3B

Community 1.3 to 1.1

This pathway may be caused by cool-season grazing rest with warm-season grazing; and/or prescribed fire

Pathway 1.3A
Community 1.3 to 1.2

This pathway may be cause by cool-season grazing rest with warm-season grazing; repeated years of above average winter/spring moisture or increased run-on; and/or prescribed fire

State 2
Shrubland

This state is characterized by the predominance of shrubs, especially greasewood. On areas with higher salt concentrations, greasewood often occurs as the sole dominant. Less commonly, greasewood occurs as a codominant with fourwing saltbush or shadscale saltbush; these areas typically have little herbaceous understory. On areas that are less salt-affected, greasewood may coexist with big sagebrush; these areas will typically have a greater understory of grasses, and alkali sacaton often occurs in widely spaced clumps or tussocks restricted to the shrub interspaces. Western wheatgrass may be more uniformly distributed within the shrub interspaces, occurring as widely scattered, low-vigor individual plants. Greasewood can increase the salts beneath its canopy by the uptake and concentration of salts in its leaves and the subsequent deposition of litter (Eddleman and Romo, 1987, Romo and Eddleman, 1985). This mechanism may reinforce greasewood dominance by suppressing competing plant seedlings. Diagnosis: Shrubs are dominant. Grass cover is variable ranging from extremely sparse (greasewood dominated) to patchy with frequent large bare areas present. Soil sealing is common in shrub interspaces. Evidence of erosion such as pedestalling of plants, litter dams, elongated water flow patterns, and rills may be common, especially on areas with slopes >3%.

Community 2.1
Shrub Dominated

This community is shrub dominated with greasewood and saltbush making up the majority of the shrubs. These areas typically have little herbaceous understory. On areas that are less salt-affected, greasewood may coexist with big sagebrush; these areas will typically have a greater understory of grasses, and alkali sacaton often occurs in widely spaced clumps or tussocks restricted to the shrub interspaces. Western wheatgrass may be more uniformly distributed within the shrub interspaces, occurring as widely scattered, low-vigor individual plants.

State 3

Gullied

Gullied State: Accelerated erosion and gully formation characterize this state. Greasewood, big sagebrush, or saltbush species are the dominant vegetation. Herbaceous cover is sparse, occurring as small patches or widely spaced individual plants occupying shrub interspaces and consist of western wheatgrass, alkali sacaton, galleta, annual grasses, and forbs. Diagnosis: Gullying is extensive and may become deep enough to restrict vehicle and livestock movement. Grass cover is sparse, and litter is confined to shrub bases or other obstructions to overland flow. Soil sealing is widespread and occupies most shrub interspaces.

Community 3.1
Shrub and Annual Grass

Greasewood, big sagebrush, or saltbush species are the dominant vegetation. Herbaceous cover is sparse, occurring as small patches or widely spaced individual plants occupying shrub interspaces and consist of western wheatgrass, alkali sacaton, galleta, annual grasses, and forbs. Gullying is extensive and may become deep enough to restrict vehicle and livestock movement.

Transition T1A
State 1 to 2

Transition to Shrub-Dominated (T1A) Soil drying due to blocked or redirected flow of run-on water may favor deeper-rooted shrubs and initiate the transition to the Shrub-Dominated State. Additionally, loss of grass cover due to overgrazing and drought in conjunction with the decreased competition for resources resulting from grass loss favors shrub dominance. Loss of grass cover reduces organic matter and may result in soil sealing and reduced infiltration. Soil sealing can lead to the accumulation of s alts on the soil surface and inhibit herbaceous seedling establishment. Key indicators of approach to transition: --The decrease of cool-season grasses --The formation of widely spaced rings or tussocks of alkali sacaton --Increase in size and frequency of bare patches --Increase in amount of shrub seedlings

Restoration pathway R2A
State 2 to 1

Restoration Pathway to Reference State (R2A) If shrub dominance is due to soil drying, moving or rerouting obstructions or diversions to overland flow may be necessary to restore natural run-on flow patterns. Brush control is necessary to reduce the competitive influence of shrubs and reestablish grass dominance. However, greasewood is difficult to control. It is resistant to fire (Rickard and McShane, 1984) and can re-sprout following mechanical and chemical treatment (Cluff et.al, 1983, Mueggler and Steward, 1980). Seeding salt-tolerant grasses may be necessary. The use of livestock or mechanical means to break up physical crusts and improve infiltration may enhance seeding success.

Transition T2A
State 2 to 3

Transition to Gullied State (2) The continued loss of grass cover in conjunction with soil sealing, increased overland flow, and resulting erosion can cause the transition to the Gullied state. The continued loss of grass cover may be due to extended drought, overgrazing, and the competitive influence of shrubs for available soil moisture. The loss of organic matter and high salt content may increase soil susceptibility to crust formation especially on finer textured soils (USDA, Natural Resources Conservation Service. 2001). Decreased infiltration and increased flow rates due to grass cover loss and soil crusting facilitate erosion and gully formation. This state may not occur on all landscape positions. Those sites that are nearly level or are on depositional landforms may not be prone to erosion and gullying. Key indicators of approach to transition: --Decrease in amount of grass cover --Increase in size and frequency of bare patches and surface crusting --Increase in amount of rills and presence of small gullies

Restoration pathway R3A
State 3 to 2

Restoration Pathway to Reference State (R3A). Erosion control such as shaping and filling gullies or installing grade stabilization structures will be necessary to restore hydrology. Brush control will be needed to reduce the competitive influence of shrubs and restore grasses. Seeding will be required to reestablish grass dominance. Rest from grazing followed by prescribed grazing will help ensure grass establishment following seeding. The multiple practices required to drive the transition back to the Reference State are costly, and chances for successful grass establishment are dependent on the degree of soil degradation and adequate precipitation following seeding.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				315–368	
	alkali sacaton	SPAI	*Sporobolus airoides*	315–368	–
2				53–105	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	53–105	–
3				210–263	
	western wheatgrass	PASM	*Pascopyrum smithii*	210–263	–
4				105–158	

4				105–158	
	squirreltail	ELEL5	*Elymus elymoides*	105–158	–
5				105–158	
	James' galleta	PLJA	*Pleuraphis jamesii*	105–158	–
6				53–105	
	blue grama	BOGR2	*Bouteloua gracilis*	53–105	–
7				53–105	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	53–105	–
	saltgrass	DISP	*Distichlis spicata*	53–105	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	53–105	–
Forb					
8				32–53	
	iodinebush	ALOC2	*Allenrolfea occidentalis*	32–53	–
	goldenweed	PYRRO	*Pyrrocoma*	32–53	–
9				32–53	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	32–53	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	32–53	–
	ragwort	SENEC	*Senecio*	32–53	–
Shrub/Vine					
10				32–53	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	32–53	–
11				32–53	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	32–53	–
12				32–53	
	big sagebrush	ARTR2	*Artemisia tridentata*	32–53	–
13				53–105	
	fourwing saltbush	ATCA2	*Atriplex canescens*	53–105	–
14				32–53	
	winterfat	KRLA2	*Krascheninnikovia lanata*	32–53	–
15				11–32	
	Shrub, deciduous	2SD	*Shrub, deciduous*	11–32	–
	bud sagebrush	PIDE4	*Picrothamnus*	11–32	–

			desertorum		

Animal community

Habitat for Wildlife:

This site provides habitats which support a resident animal community that is characterized by mule deer, coyote, desert cottontail, plains pocket mouse, deer mouse, Botta's pocket gopher, scaled quail, house finch, short-horned lizard, striped whiptail, and Western spadefoot toad.

Hydrological functions

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series-----------------Hydrologic
Group Billings------------------B
Breadsprings--------------------C
Cementlake----------------------D
Christianburg-------------------D
Conchovar-----------------------C
Gobernador----------------------D
Heshotauthla--------------------D
Nahodish------------------------D
Navajo--------------------------D
Ravola--------------------------D
Rehobeth------------------------D
San Mateo-----------------------B
Sparank-------------------------D
Sparham-------------------------D
Venadito------------------------D
Werlog--------------------------C

Recreational uses

These sites have very low potential for outdoor recreation.

Wood products

This site has no significant potential for wood production.

Other products

Grazing:

This site is well suited for grazing use during all seasons of the year by both small and large animals. Periodic rest from grazing use by domestic livestock during the growing season is necessary to maintain a balanced, healthy plant community.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month
Similarity Index-------------------Ac/AUM
100 - 76-------------------------2.0 – 3.0
75 – 51-------------------------2.9 – 5.9
50 – 26-------------------------5.8 – 11.0
25 – 0--------------------------11.0+

Type locality

Location 1:	Sandoval County, NM
Location 2:	Rio Arriba County, NM
Location 3:	San Juan County, NM

Other references

Brotherson, J.D. 1987. Plant community zonation in response to soil gradients in a saline meadow near Utah Lake Utah County, Utah. Great Basin Naturalist Vol. 47: No 2 Article 20.

Cartledge, T. R., and J. G. Propper. 1993. Pinon-Juniper Ecosystems through Time: Information and Insights from the Past. In Gen. Tech. RM-236 - Managing Pinon-Juniper Ecosystems for Sustainability and Social Needs.

Cleland, D.T.; Freeouf, J.A.; Keys, J.E., Jr.; Nowacki, G.J.; Carpenter, C; McNab, W.H. 2007. Ecological Subregions: Sections and Subsections of the Conterminous United States.[1:3,500,000], Sloan, A.M., cartog. Gen. Tech. Report WO-76. Washington, DC: U.S. Department of Agriculture, Forest Service.

Cluff, G.J., B.A. Roundy, R.A. Evans and J.A. Young. 1983. Herbicidal control of greasewood (Sarcobatus vermiculatus) and salt rabbitbrush (Chrysothamnus nauseosus ssp. consimilis). Weed Sci. 31:275-279

Eddleman, L.E. and J.T. Romo. 1987. Sodium relations in seeds and seedlings of Sarcobatus vermiculatus. Soil Science. 143:120-123.

Elmore, A.J., S.J. Manning, J.F. Mustard, and J. M. Craine. 2006. Decline in alkali meadow vegetation cover in California: the effects of groundwater extraction and drought. Journal of Applied Ecology 43:770-779.

Griffith, G.E.; Omernik, J.M.; McGraw, M.M.; Jacobi, G.Z.; Canavan, C.M.; Schrader, T.S.; Mercer, D.; Hill, R.; and Moran, B.C., 2006. Ecoregions of New Mexico (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,400,000).

Hauser, A. Scott. 2006. Distichlis spicata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2017, August 9].

Johnson, Kathleen A. 2000. Sporobolus airoides. In: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2017, August 9].

Natural Resources Conservation Service (NRCS). 2003. Ecological Site Description for Salty Bottomland R036XB010NM: USDA, Albuquerque. New Mexico.

Mueggler, W. F.; Stewart, W. L. 1980. Grassland and shrubland habitat types of western Montana. In The Fire Effects Information System [Data base]. U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory (2004, January), Missoula, MT. Available: http://www.fs.fed.us/database/feis/.

Passey, H. B., W. K. Hugie, E. W. Williams, and D. E. Ball. 1982. Relationships between soil, plant community, and climate on rangelands of the Intermountain west. USDA, Soil Conservation Service, Tech. Bull. No. 1669.

Rickard, W.H. and M.C. McShane. 1984. Demise of spiny hopsage shrubs following summer wildfire: An authentic record. Northwest Sci. 58:282-285.

Romo, J.T. and L.E. Eddleman. 1985. Germination response of greasewood (Sarcobatus vermiculatus) to temperature, water potential and specific ions. J. Range Manage. 38:117-120.

LANDFIRE : LANDFIRE National Vegetation Dynamics Models. (2007, January - last update). [Homepage of the LANDFIRE Project, U.S. Department of Agriculture, Forest Service; U.S. Department of Interior], [Online]. [2017, August 8]. Landfire Biophysical Setting Model 2311530: Page 206-209.

USDA, Natural Resources Conservation Service. 2001. Soil Quality Information Sheet. Rangeland Soil Quality" Physical and Biological Soil Crusts. Rangeland Sheet 7 [Online]. Available: http://soils.usda.gov/sqi/soil_quality/land_management/range.html.

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296.

Western Regional Climate Center. Retrieved from http://www.wrcc.dri.edu/summary/Climsmco.html on December 27, 2017.

Contributors

Christine Bishop
Don Sylvester
Elizabeth Wright
Michael Carpinelli
Suzanne Mayne Kinney
John Tunberg

Approval

Kirt Walstad, 12/20/2024

Acknowledgments

Project Staff:

Suzanne Mayne-Kinney, Ecological Site Specialist, NRCS MLRA, Grand Junction Colorado SSO
Chuck Peacock, MLRA Soil Survey Leader, NRCS MLRA Grand Junction Colorado SSO
Alan Stuebe, MLRA Soil Survey Leader, NRCS MLRA Alamosa Colorado SSO Program Support:
Brenda Simpson, NRCS NM State Rangeland Management Specialist, Albuquerque, NM
Scott Woodhall, NRCS MLRA Ecological Site Specialist-QA Phoenix, AZ
Eva Muller, Regional Director, Rocky Mountain Regional Soil Survey Office, Bozeman, MT
Rick Strait, NM State Soil Scientist, Albuquerque, NM
Steve Kadas, CO State Resource Conservationist, Albuquerque, NM

--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)	
Contact for lead author	
Date	05/21/2025
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

---

2. **Presence of water flow patterns:**

---

3. **Number and height of erosional pedestals or terracettes:**

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

---

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**