Ecological site R036XB009NM
Salt Meadow

Last updated: 12/20/2024
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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.

MLRA notes

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

This MLRA is in New Mexico (58 percent), Colorado (32 percent), and Utah (10 percent). It makes up about 23,885 square miles (61,895 square kilometers). The major towns in the area are Cortez and Durango, Colorado; Santa Fe and Los Alamos, New Mexico; and Monticello, Utah. The city of Grand Junction in Colorado, and Interstate 70 are just outside the northern tip of this area. Interstate 25 crosses through the middle of the MLRA, and U.S. Highway 550 runs along the MLRA's southwest boundary in New Mexico. Mesa Verde National Park and the Bandelier, Hovenweep, Natural Bridges, Yucca House, and Colorado National Monuments are in the area. Many Indian reservations are in this MLRA. The largest are the Southern Ute, Ute Mountain, and Jicarilla Apache Reservations. Also in the area are the Cochiti, Jemez, Nambe, Navajo, Picuris, Pojoaque, San Felipe, San Ildefonso, San Juan, Sandia, Santa Ana, Santa Clara, Santa Domingo, Taos, Tesuque, and Zia Reservations.

This MLRA is within the Intermontane Plateaus Region. It is mainly in the Canyon Lands and Navajo Sections of the Colorado Plateau Province, partly in the Mexican Highland Section of the Basin and Range Province, and extends marginally into the Southern Rocky Mountains Province. Underlying sedimentary rock controls the landforms seen in most places, but fluvial landforms are in the Rio Grande Rift Basin at the southeastern portion of the MLRA. The elevation is commonly 4,600 to 8,500 feet (1,400 to 2,590 meters) and is generally highest (as high as 9,300 feet or 2,835 meters) in the foothills and high mesas that border the Southern Rocky Mountains. Relief is typically less than 1,500 feet (455 meters). The upper reaches of the Rio Grande and San Juan Rivers and their tributaries are in the part of this MLRA, near the Colorado and New Mexico state lines. The Rio Puerco and Rio Chama Rivers are in the New Mexico part of the MLRA. The Dolores and

San Miguel Rivers are in the Colorado part of the MLRA, and a short reach of the Colorado River crosses this MLRA near the Utah and Colorado state lines.

Predominantly horizontal sedimentary beds from the Jurassic, Cretaceous, and Tertiary Periods underlie most of the MLRA. Representative formations are the Morrison Formation, Dakota Sandstone, Mancos Shale, Cliff House Sandstone, and other members of the Mesa Verde Group, including the Animas Formation and the San Jose Formation. The sedimentary rocks have eroded into plateaus, mesas, hills, and canyons. Thick eolian deposits from the Pleistocene Epoch blanket the tops of mesas in some areas. Small areas of Tertiary and Quaternary volcanic rocks, including cinder cones and lava flows, are in the Rio Grande Rift Basin in New Mexico. Broad valleys in the rift basin have accumulations of deep alluvial sediments, and fan remnants are commonplace.

The dominant soil orders in this MLRA are Alfisols, Inceptisols, Mollisols, Entisols, and Aridisols. The soil moisture regime is mainly ustic, but an aridic soil moisture regime that borders on ustic is present in some areas. The soil temperature regime is mesic or frigid. Mineralogy is dominantly mixed or smectitic. In warmer places of the MLRA, shallow Ustorthents (Menefee Series) formed in residuum on shale hills and mesas. Shallow Haplustalfs (Arabrab Series) and Torriorthents (Rizno Series) formed in material weathered from sandstone on mesas, hills, and cuestas. Moderately deep, loamy Haplargids (Gapmesa Series) and very deep, loamy Haplustalfs (Orlie series) formed in slope alluvium derived from sandstone and shale on mesas or fan remnants. Very deep, clayey Haplustepts (Roques series) formed in alluvium derived from shale on valley sides. Very deep, silty Haplustalfs (Cahona and Wetherill Series) formed in eolian deposits on hills and mesas. In cooler places, very deep, clayey Haplustalfs (Goldbug Series) formed in slope alluvium derived from sandstone and shale on hills and mesas. Shallow Argiustolls (Fivepine Series) formed in slope alluvium and residuum derived from sandstone. Moderately deep Argiustolls (Nortez Series) formed in eolian deposits derived from sandstone on hills and mesas.

LRU notes

MLRA 36 is in the Colorado Plateau, a physiographic province existing throughout eastern Utah, western Colorado, western New Mexico, and northern Arizona. Uplifted plateaus, canyons, and other land features formed by erosion are characteristic of the MLRA. The Colorado Plateau lies south of the Uintah Mountains, north of the Mogollon Rim in the Transition Highlands, west of the Rocky Mountains, and east of the highlands in central Utah. MLRA 36 is in the higher-elevation portion of the Colorado Plateau, which has

broken topography and lacks perennial water sources. This MLRA has a long history of use by prehistoric humans, and archaeological evidence indicates their activities modified the native pinyon-juniper woodlands. Additional alterations to the native conditions of the area occurred at the time of European settlement (Cartledge and Propper, 1993). Historically, this area also included the natural influences of herbivory, fire, and climate. However, the area rarely served as a habitat for large herds of native herbivores or large, frequent fires due to the broken topography. This ecological site is highly variable, and plant community composition varies in response to water fluctuations.

The lower part of MLRA 36 developed under climatic conditions of hot and dry summers, summer rain showers, mild winter temperatures, and little to no snow. This area has climatic fluctuations, ranging from above-average annual precipitation to years of drought, and prolonged droughts are commonplace.

Forbs are the most dynamic vegetative component of the plant communities in the MLRA, and species composition can vary up to fourfold on any given ecological site (Passey et al., 1982). The precipitation and climate of MLRA 36 are conducive to producing pinyon-and-juniper and sagebrush complexes and highly-productive sites at the bottoms of canyons. The dominant species in the Colorado Plateau are Wyoming big sagebrush (Artemisia tridentata var. wyomingensis), mountain big sagebrush (Artemisia tridentata var. vaseyana), and black sagebrush (Artemisia nova), basin big sagebrush (Artemisia tridentata ssp. tridentata), Utah juniper (Juniperus utahensis), oneseed juniper (Juniperus monosperma), and twoneedle pinyon (Pinus edulis). Oneseed juniper can discontinue active growth under limited moisture conditions and resume growth when moisture availability improves. This growth pattern may represent a critical adaptation allowing them to survive on very arid sites. It is possible that drought may kill small trees, but mature oneseed junipers are resilient to drought, especially in comparison to twoneedle pinyon (Johnsen, 1962).

The Land Resource Unit (LRU) has 10 to 16 inches of annual precipitation and a mesic soil temperature regime. The LRU is in the lower part of MLRA 36 and is dominated by monsoons in summer, unlike the upper part of MLRA 36.

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 ection) Southern Rocky Mountains Basin
and Range (Mexican Highland and Sacramento
Section)

Ecological site concept

The Salt Meadow Ecological Site in 36XB originates from the pre-existing (Salt Meadow R036XB009NM) range site (NRCS, 2003). The effective precipitation for the site ranges from 10 to 16 inches.This ecological site is on gently sloping playas, alluvial fans, floodplains, lake plains, stream terraces, and lake terraces. Soils are typically deep and are affected by sodium. Surface textures may be loam, clay loam, or silty clay. The subsoil is usually a clay or clay loam. The seasonal water table fluctuates between 24 and 72 inches for most of the growing season. The ecological site has an aridic ustic or ustic aridic soil moisture regime and a mesic soil temperature regime. The surface soil texture is commonly loam, clay loam, or silty clay. Cobbles or gravel are typically present in the profile.

Associated sites

F036XA136NM	**Pinyon-Utah juniper/Apache plume** Slopes are 1-35%; Soils are moderately deep to very deep and can be skeletal/non-skeletal. Soil surface textures are gravelly to extremely loam, loam, very gravelly clay loam, very gravelly to extremely gravelly coarse sandy loam, extremely cobbly fine sandy loam, extremely gravelly sandy clay loam, fine sandy loam, very gravelly fine sandy loam, sandy loam, gravelly sandy loam, and ashy loamy coarse sand with subsoil that are loamy. Landforms are escarpments, fan remnants, mesas, hills, cuestas, benches, fan piedmonts, valley sides, eroded fan remnants, and mountain slopes.
R036XB006NM	**Loamy** Slopes 1-15%; soils are very shallow to shallow and skeletal and not skeletal; soil surface are loam, stony to very stony loam, very cobbly loam, fine sandy loam, very cobbly fine sandy loam, stony silt loam, stony silty clay loam, and cobbly silty clay loam; Parent materials are basalt influences but can have sometimes influence from sandstone and/or shale. Landforms nearly level to gently sloping mesas, lava plateaus, lava flows, lava flows on valley floors, and ridges.
F036XA005NM	**Riverine Riparian** Site has a water table at 12-36” Landforms are V-shaped valleys, U-shaped valleys and overflow Stream (channel).
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** 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.
R036XB016NM	**Loamy Savanna** Loamy Savanna - Slopes are 1-15%; Soils are moderately deep to deep; soil surface range from very fine sandy loam to clay loam. Subsoil is fine-textured. Landforms are nearly level to undulating plains, hills, ridges, and mesa tops, although it may occur on more rolling landscapes.

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

R036XB138NM	**Marshy** Water table 0-12” in depth; soils are deep; with soil textures from sandy loam to loamy sand with loamy subsoil. Landform stream and marsh on abandon channels on floodplains of valley floors with intermittent streams.
R036XB008NM	**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.
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.
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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Distichlis spicata* (2) *Sporobolus airoides*

Physiographic features

This ecological site is on nearly level to gently sloping playas, alluvial fans, floodplains, lake plains, stream terraces, and lake terraces. The site forms a narrow band adjacent to a flowing or intermittent stream. Slopes are less than three percent. Elevations range from 6,200 to 7,200 feet above sea level. This ecological site is dependent on sub-irrigation and overflow for the moist soil condition.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Alluvial fan (3) Stream terrace
Flooding duration	Brief (2 to 7 days) to long (7 to 30 days)
Flooding frequency	Very rare to occasional
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	Rare to occasional
Elevation	6,200–7,200 ft
Slope	0–5%
Water table depth	24–72 in
Aspect	Aspect is not a significant factor

Climatic features

This site has a semiarid, continental climate. There are distinct seasonal temperature variations. Mean annual precipitation ranges from 10 to 16 inches. Cold, dry winters in which winter moisture is less than that of summer characterize the overall climate. Wide yearly and seasonal fluctuations in precipitation are commonplace for this climatic zone. The annual precipitation can range from 5 to 25 inches. Approximately 25 to 35 percent of annual precipitation falls as snow, and 65 to 75 percent 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 typically occurs from July through September. August is typically the wettest month of the year. The driest period is usually from November to April, and February is generally 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. Plant growth usually begins in March and ends with plant maturity and seed dissemination when moisture deficiency and warmer temperatures occur in early June. There is also a period of growth in the fall. Brief thunderstorms, usually occurring in the afternoon and evening, characterize summer precipitation. Winter moisture usually occurs as snow and 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 inch during the winter months. The highest snowfall record is 57.1 inches during the winter of 1993 to 1994. The frost-free period typically ranges from 110 to 145 days, and the freeze-free period ranges from 140 to 170 days. The last spring freeze occurs anywhere from the middle of April to the first week of May. The first fall freeze occurs somewhere between the middle of October to the first week of November. Mean daily air temperature ranges from about 29 degrees F to 69 degrees F during the year, averaging 37 degrees F in winter and 67 degrees F in summer. The coldest winter temperature recorded was minus 20 degrees F on January 6, 1971, and the warmest winter temperature recorded was 70 degrees F on February 28, 1965. The coldest summer temperature recorded was 26 degrees F on June 1, 1980. The hottest days on record, July 9, 2003, and June 21, 1968, had a high of 100 degrees F. Climate data comes from the Western Regional Climate Center (2017) for the climate station in El Rito, New Mexico.

Table 3. Representative climatic features

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

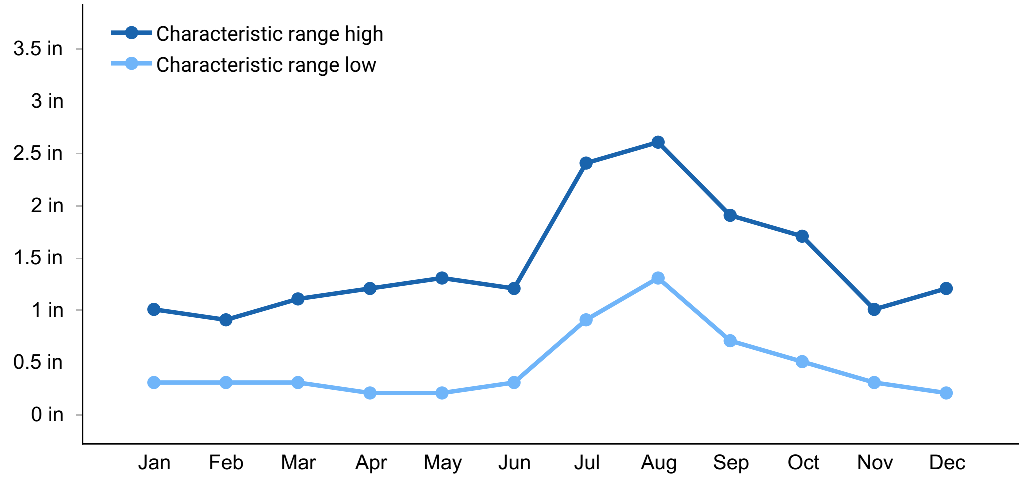


Figure 1. Monthly precipitation range

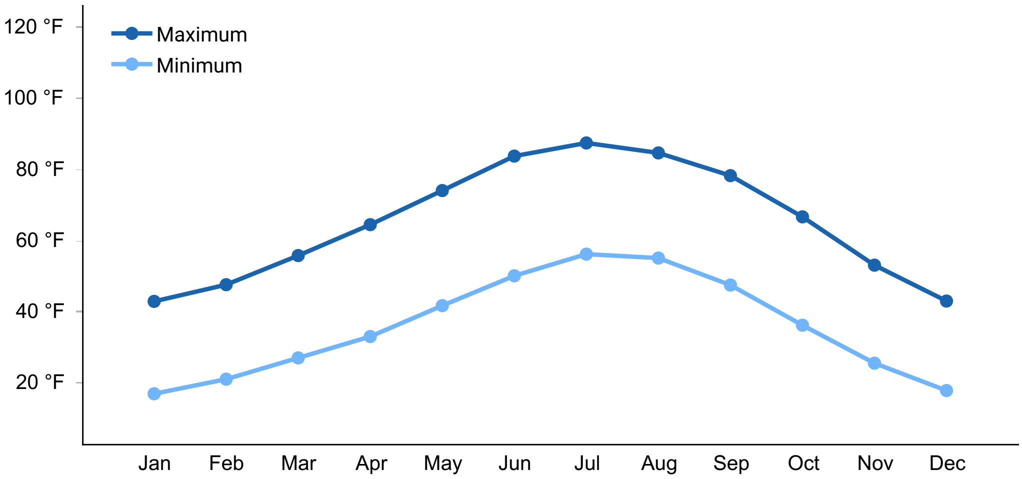


Figure 2. Monthly average minimum and maximum temperature

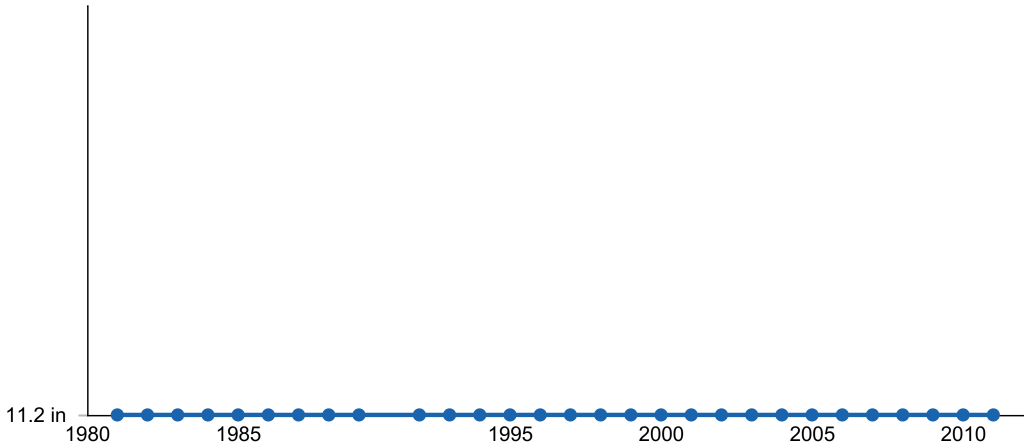


Figure 3. Annual precipitation pattern

Climate stations used

- (1) ABIQUIU DAM [USC00290041], Gallina, NM
- (2) COCHITI DAM [USC00291982], Pena Blanca, NM
- (3) EL RITO [USC00292820], El Rito, NM
- (4) LYBROOK [USC00295290], Dulce, NM
- (5) NAVAJO DAM [USC00296061], Navajo Dam, NM
- (6) CUBA [USC00292241], Cuba, NM
- (7) SANTA FE 2 [USC00298085], Santa Fe, NM

Influencing water features

Water from wetlands or streams is a major influence to this ecological site.

Soil features

The soils in this site are typically deep and are affected by sodium. Surface textures may be loam, clay loam, or silty clay. The subsoil is usually a clay or clay loam. Water intake rate is slow to very slow. Permeability is moderately slow to very slow. Plant roots may be restricted by the sodium content of the soil. Parent materials include alluvium deposited by streams, fans, and mixed sources derived from igneous and sedimentary rock. Shale, sandstone, and siltstone are the common sedimentary rock often intermixed.

This site is found in NM648, NM682, NM698 and NM650 soil survey. This ecological site has been correlated to the following soils with the listed particle control sections Warm Springs (fine-loamy), Gojiya, Sparham (fine), Catman (very fine)

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale (2) Alluvium–shale (3) Alluvium–shale and siltstone

Surface texture	(1) Clay loam (2) Silty clay (3) Loam
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained to well drained
Permeability class	Moderately slow
Soil depth	60 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2.8–7.1 in
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–13
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Salt meadows and bottomlands are influenced by frequent flooding or by a shallow water table creating limited wetland properties, but it is not classified as a riparian community. Dominantly the species on these ecological sites classify as facultative species. These ecological sites are typically small scale on the landscape, but are important for specific habitats 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 five vegetation zones, all zones having saltgrass. Species distribution was influenced by plant competition and soil moisture, chemistry, texture, minerals and moisture. Salts were leached during high water and salts “wicked” towards the soil surface during drier periods. Depression areas had increase in soil moisture and consequently decreased salinity. Annuals and introduced species occurred on ridges or mounds with higher salinity and pH. The second study showed that s groundwater pumping in the Owens Valley of California transitioned the alkali meadows (dominated by alkali sacaton and saltgrass) to a rubber rabbitbrush-meadow due to an increase in rabbitbrush as the water table dropped. (Johnson, 2000, Hauser, 2006, Elmore et al 2006)

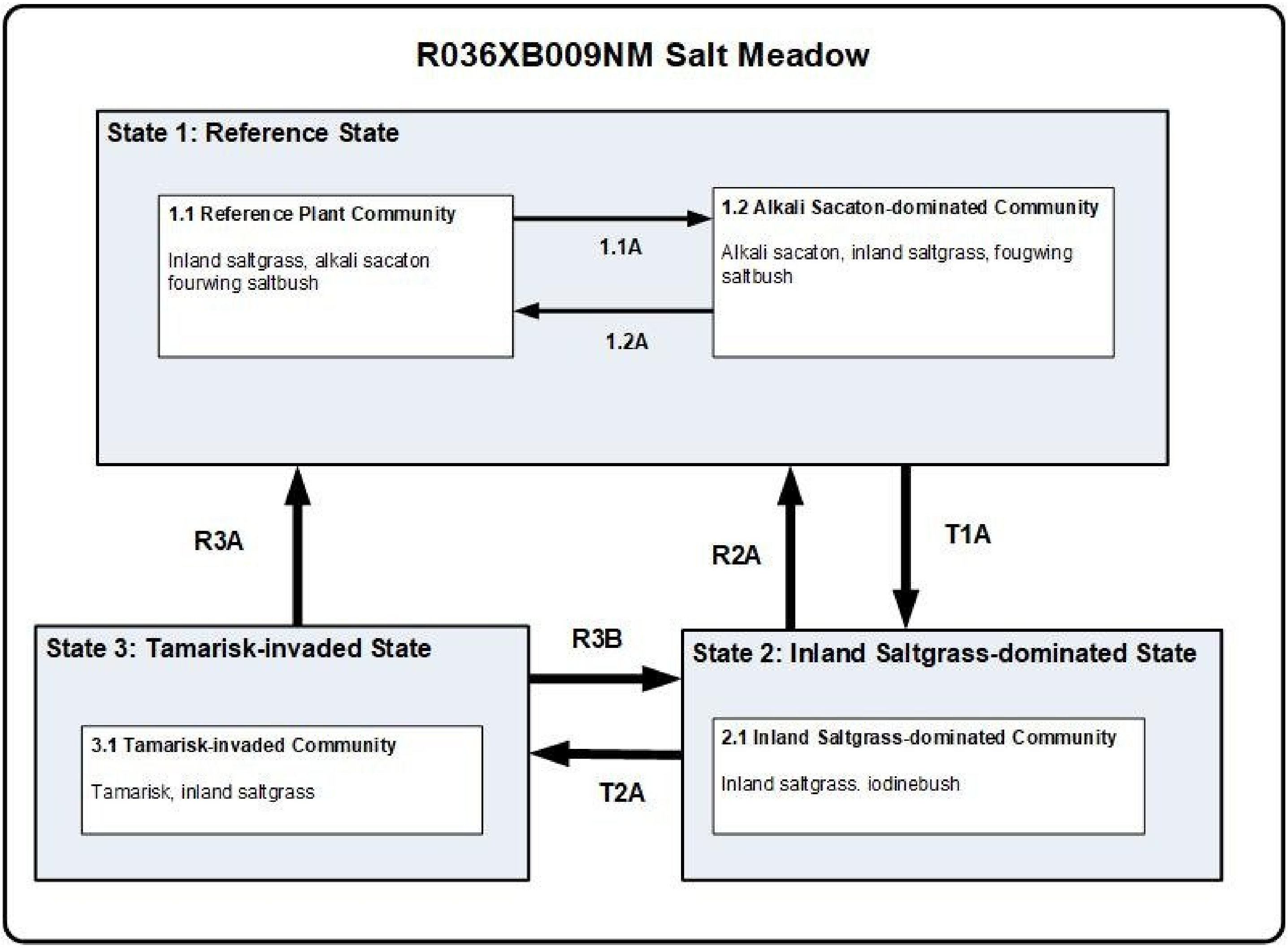
Fire in alkali sacaton and saltgrass plant communities are rare. Marshes, grasslands and dry meadow ecological sites have a fire frequency of 1 to 10 years while desert grasslands and greasewood sites have a fire return interval of 35 to 100 years (Johnson, 2000, Hauser, 2006). Another source, has greasewood-saltgrass communities with a fire return interval is <200 (Landfire, 2007). Greasewood-saltgrass community and not a meadow community. This ecological site is not described in the fire regime literature. Literature currently available, describes the general vegetation types in the United States.

Tamarisk or Russian olive are common invaders on this ecological site. Russian olive and tamarisk prefer low-lying areas that retain water near the surface or have running water for the majority of the year. These invaders are typically found along perennial streams and rivers. Russian olive are commonplace in close proximity to agricultural fields and most likely originate from cultivated plantings.

Ecological site descriptions will be updated as more data and knowledge are gained. Salt Meadow and bottomland sites typically have minimal data and completed studies. This MLRA has a deficiency in research. The majority of the research that has occurred in this MLRA has been in sagebrush and pinyon-juniper ecological sites.

Variability in climate, soils, aspect, and complex biological processes will cause plant communities to differ. The factors contributing to the annual production variability include the use of the site by wildlife, drought, and the presence of insects. Factors contributing to site variability include soil texture, depth, rock fragments, slope, aspect, and microtopography. The species lists for the site are representative and not a complete list of all species present or potentially present. The lists do not cover the full range of conditions, species, or responses for the site. The state-and-transition model below uses available research, field observations, and expert interpretations that could change as knowledge increases. After more data collection, some of these plant communities may be revised or removed, and new ones added. The following diagram does not necessarily include all the transitions and states this site may exhibit, but it does show some of the most common plant communities.

State and transition model



Legend

1.1A – Repeated drought years or reduced run-on
1.2A – Increased run-on, longer wet periods, prescribed grazing
T1A – Increased run-on, longer wet periods; repeated wet winter/spring, soil compaction/sealing/slowed infiltration, repeated growing -season-long grazing and excessive stocking.
T2A – Increased run-on, longer wet periods; repeated wet winter/spring, soil compaction/sealing/slowed infiltration, repeated growing -season-long grazing and excessive stocking, fire, drainage of site cause by roads, trails, head cutting
R2A – Repeated wet winter/spring, rest from grazing, prescribed grazing, seeding adapted grasses
R3A – Prescribed fire, prescribed grazing, tamarisk control, seeding adapted grasses, headcut repair
R3B – Prescribed fire, prescribed grazing, tamarisk control, seeding adapted grasses

State 1
Reference

The Reference state is characterized a grassland with salt tolerant species such as inland saltgrass and alkali sacaton. Saltgrass is typically the dominant grass on fine textured soils with a high salt content, and a shallow water table. Alkali sacaton may dominate on soils with lower salt concentrations or where the water table occurs at a greater depth. Fourwing saltbush, the dominant shrub, comprises <5% of the vegetation. Forbs such as seepweed and iodinebush are present in small amounts. When the plant community deteriorates, inland saltgrass, seepweed, iodinebush, and tamarisk (saltcedar) dominate amidst large bare–ground interspaces. Overgrazing, soil sealing, soil compaction, or increases in salinity initiate the transition to the Inland Saltgrass-dominated State. Overgrazing reduces the competitive influence of the more palatable grasses, promotes soil sealing by reducing plant cover and organic matter, and increasing the amount of bare ground. Inland saltgrass possesses the ability to break through compacted soils and survive under conditions of extreme salinity. On areas with high salt concentrations, flooding may help flush salts from the system, provided the site has adequate drainage. Seeding may be necessary to reestablish the more palatable grasses.

Community 1.1
Inland Saltgrass and Alkali Sacaton

The reference plant community is dominated by inland saltgrass with subdominant alkali sacaton. Other important grass and grasslike species include western wheatgrass, salt sedge, Nuttall's alkaligrass, and alkali cordgrass. Fourwing saltbush and iodinebush are characteristic shrubs, with desert seepweed typically occurring as the most common forb/sub-shrub. Plant community composition on this site is regulated by water table depth, salinity, and soil texture. Inland saltgrass is favored by high salinity, a shallow water table, and fine-textured soils. Alkali sacaton may attain dominance on soils with lower salt concentrations or on areas where the water table occurs at a greater depth. Grass and litter cover is uniform with few large bare areas present. Shrubs are scattered with canopy cover averaging five 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	1080	1440	1800
Forb	60	80	100
Shrub/Vine	60	80	100
Total	**1200**	**1600**	**2000**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	1-10%
Grass/grasslike foliar cover	30-40%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%

Litter	30%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	25%

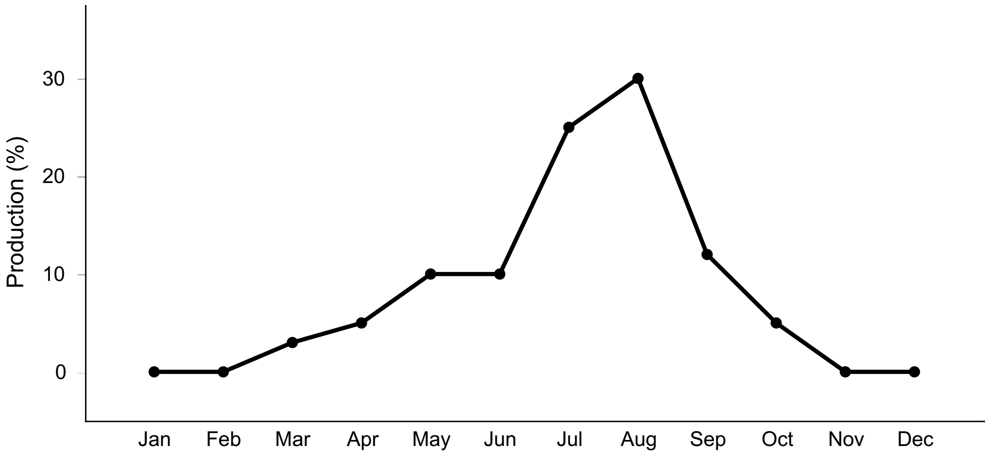


Figure 6. Plant community growth curve (percent production by month). NM0009, R036XB009NM Salt Meadow HCPC. R036XB009NM Salt Meadow HCPC Grassland with minor forb and shrub components..

Community 1.2
Alkali Sacaton Dominated

This plant community is a meadow community characterized by alkali sacaton, inland saltgrass, salt-tolerate sedges, and four-wing saltbush.

Pathway 1.1A
Community 1.1 to 1.2

Causes of this pathway include extended periods of drought, reduced run-on, or overgrazing

Pathway 1.2A
Community 1.2 to 1.1

This pathway is a response to increased run-on, longer wet periods, and prescribed grazing.

State 2
Inland Saltgrass Dominated

Inland Saltgrass-dominated State are characterized by dense sod-like areas of inland saltgrass with frequent interspaces of salt-crusted bare ground. Iodinebush or four-wing saltbush are scattered between patches of saltgrass. In areas of heavier salt concentrations, iodinebush may be more prevalent. The dominance of Inland saltgrass and sparsity or absence of Alkali sacaton and western wheatgrass are indicators of the transition. Physical and chemical crusts are common.

Community 2.1
Inland Saltgrass

Inland saltgrass is dominant in this community with alkali sacaton and western wheatgrass sparse or absent. Physical and chemical crusts are common.

State 3
Tamarisk Invaded

Tamarisk-invaded state is characterized by the presence of tamarisk. Where the water table is shallow (less than 4 feet), tamarisk typically occurs as scattered multi-stemmed trees (Tesky, 1992), with an understory dominated by alkali sacaton or inland saltgrass. On areas where the water table is deeper (5 to 20 feet), tamarisk may eventually dominate forming a dense monoculture (Horton et al, 1960, Tesky, 1992) with little or no herbaceous vegetation beneath the tree canopy. Disturbance such as fire, heavy grazing, and drought may encourage tamarisk establishment by reducing the competitive influence of native vegetation. Changes in timing, intensity, and frequency of flooding favors tamarisk establishment. Tamarisk control is costly and may require a combination of control methods and the return of natural flooding regimes. Recovery from the tamarisk-dominated state requires combined, multiyear treatments--herbicide, root plow, fire, seeding, and follow-up control of resprouts. These communities have a zonal or target appearance corresponding with water depth and salt concentrations, progressing from Community Phase 1.1 (CP 1.1) to CP 3.1 as distance to water table increases. The presence of Tamarisk indicates a transition to this state. Grass cover is variable, ranging from patchy to very sparse. Soil sealing and crusts are present in most bare interspaces.

Community 3.1
Tamarisk

Tamarisk is present on the site. Grass cover is variable, ranging from patchy to very sparse.

Transition T1A
State 1 to 2

Drivers of the transition to Inland Saltgrass-dominated State (T1A) is overgrazing, compaction, soil surface sealing, and increased salinity. Heavy grazing causes a decrease in palatable grasses, providing a competitive advantage for inland saltgrass. The loss of grass also increases the size and frequency of bare interspaces that seal over with chemical or physical crusts. Soil crusts can limit seedling establishment and increase salinity at the soil surface by decreasing infiltration, preventing water from flushing salts out of the rooting zone. Excessive trampling or vehicle traffic can cause the formation of a compaction layer, restricting root growth. Inland saltgrass is equipped with a dense network of sharp pointed underground rhizomes enabling it to spread even in heavy compacted soils (Hansen et al, 1976). Presumably, these rhizomes possess the ability to pierce soil crusts. Salinity may increase due to changes in water table depth, drainage, or the amount of water the site receives. Saltgrass can survive under conditions of extreme salinity, in part due to its ability to take up salty water and extrude the salt through specialized glands on the leaves. Key indicators of approach to transition: --Decrease in alkali sacaton and western wheatgrass --Increase in size and frequency of bare interspaces --Increased salinity

Restoration pathway R2A
State 2 to 1

Restoration Pathway to the Reference State (R2A) requires flooding to decrease salt concentrations allowing reestablishment of alkali sacaton and western wheatgrass, where salinity is the limiting factor. Compacted soil layers, argillic horizons, or poor drainage limit this alternative. Seeding, in conjunction with breaking up compaction layers or heavy soil crusts allows the reestablishment of grasses. Herbicide control of dense inland saltgrass patches prior to seeding facilitates the establishment of more palatable grasses. Prescribed grazing following grass establishment ensures successful establishment and reducing compaction.

Transition T2A
State 2 to 3

Transition to Tamarisk-invaded State (T2A) is initiated by disturbance. Disturbance such as fire, grazing, or drought may encourage the establishment of tamarisk by decreasing the vigor of native vegetation and providing competition-free areas. Changes in seasonal timing, rate, and volume of run-on water may facilitate the establishment of tamarisk (Everitt, 1980). Dams have reduced river volume and caused shifts in the timing of peak flow from spring to summer. The reduced flows in the spring and consistent water discharge in the summer lowers the water table and provides moisture during tamarisk seed production, creating ideal conditions for tamarisk establishment. Increases in salinity due to irrigation return water also promotes tamarisk dominance. Key indicators of approach to transition: --Increase in size and frequency of bare interspaces --Changes in timing and volume of peak discharge --Increased depth of water table --Increased soil salinity

Restoration pathway R3A

State 3 to 1

Restoration Pathway to the Reference State (R3A): Tamarisk control is costly and often labor intensive. Control programs utilizing herbicide, or herbicide in conjunction with mechanical control or prescribed fire, have proven effective in some instances (Duncan, 1994, Neill, 1990). Seeding may be necessary if adequate seed sources are not present. Deferment followed by prescribed grazing, will help to ensure grass establishment and proper forage use. Without restoring historical flow regimes, extensive follow-up management may be necessary to maintain the Reference State (Smith and Devitt, 1996). Repairs to headcuts and gullies may be necessary for this pathway.

Restoration pathway R3B
State 3 to 2

Restoration Pathway to the Inland Saltgrass-dominated State (R3B): Tamarisk control is costly and often labor intensive. Control programs utilizing herbicide, or herbicide in conjunction with mechanical control or prescribed fire, have proven effective in some instances (Duncan, 1994, Neill, 1990). Seeding may be necessary if adequate seed sources are not present. Deferment followed by prescribed grazing, will help to ensure grass establishment and proper forage use. Without restoring historical flow regimes, extensive follow-up management may be necessary to maintain the Inland Saltgrass-dominated State (Smith and Devitt, 1996).

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				480–560	
	saltgrass	DISP	*Distichlis spicata*	480–560	–
2				240–320	
	alkali sacaton	SPAI	*Sporobolus airoides*	240–320	–
3				80–160	
	salt sedge	CAHA5	*Carex hassei*	80–160	–
4				48–80	
	foxtail barley	HOJU	*Hordeum jubatum*	48–80	–
5				48–80	
	mat muhly	MURI	*Muhlenbergia richardsonis*	48–80	–
6				80–160	
	western wheatgrass	PASM	*Pascopyrum smithii*	80–160	–
7				80–160	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	80–160	–
8				240–320	
	alkali cordgrass	SPGR	*Spartina gracilis*	240–320	–
Forb					
9				48–80	
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	48–80	–
	iodinebush	ALOC2	*Allenrolfea occidentalis*	48–80	–
	desert seepweed	SUSU	*Suaeda suffrutescens*	48–80	–
Shrub/Vine					
10				48–80	
	Shrub, deciduous	2SD	*Shrub, deciduous*	48–80	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	48–80	–
	pale desert-thorn	LYPA	*Lycium pallidum*	48–80	–

Animal community

Grazing:

This site is well suited for grazing use during all seasons of the year by both small and large ungulates; however, it is not suited for continuous yearlong grazing by domestic livestock if a balanced, healthy plant community is to be maintained. Periodic summer deferment is needed to maintain the productivity and lessen the probability of wind and water erosion.

Habitat for Wildlife:
This site provides habitats which supports a resident animal community that is characterized by pronghorn antelope, coyote, striped skunk, black-tailed jackrabbit, Botta's pocket gopher, deer mouse, banner-tailed kangaroo rat, killdeer, house finch, western spadefoot toad, short-horned lizard, and leopard frog.

When seasonal shallow ponds occur, these sites are utilized by breeding amphibians, waterfowl, and blackbirds.

Hydrological functions

The runoff curve numbers originate from field investigations using hydrologic cover conditions and hydrologic soil groups.

Hydrologic Interpretations
Soil Series------------Hydrologic Group
Catman-----------------------D
Gojiya-----------------------D
Sparham----------------------D
Warm Springs-----------------C

Recreational uses

These sites have low potential for outdoor recreation. In years of higher precipitation, the seasonal shallow ponds improve the opportunity for bird watching.

Wood products

This site produces no significant wood products from its potential plant community.

Other information

Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month (AUM)

Similarity Index-------------Ac/AUM
100 - 76------------------2.6 – 3.0
75 – 51-------------------3.3 – 4.3
50 – 26-------------------5.3 – 6.0
25 – 0--------------------6.0+

Inventory data references

The ecological data collection for this site coincided with progressive soil surveys in the New Mexico and Arizona Plateaus and Mesas and in MLRA 36 in New Mexico. This site is within the NM678, NM606, and NM692 soil survey areas.

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Approval

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--Site Development and Testing Plan--:

Additional field data collection is necessary to validate and further refine the information in this provisional ecological site description. These efforts will include field activities using low-, medium-, and high-intensity sampling, soil correlations, and data analysis.

Additional information and data are necessary to refine the Plant Production and Annual Production Tables. The full extent of MLRA 36 also needs further investigation.

Field testing of the information contained in this Ecological Site is necessary. Once the site becomes approved, the technical team, quality control specialist, quality assurance specialist, and peers will review the work.

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	12/20/2024
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):**

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

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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):**

---

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:**