USDA Natural Resources Conservation Service

Ecological site F027XY038NV
Flood Plain

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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): 027X–Fallon-Lovelock Area

Physiography
Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years.
The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters).

Geology
Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA.

Climate
The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to midautumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation.

Water
The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout.

Soils
The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly a mesic temperature

regime, aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum.

Biological Resources
This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey's greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

LRU notes

Topography/Geomorphology: This LRU is strongly influenced by the Pluvial Lake Lahontan which reached its most recent high stand approximately 10k years ago and covered a maximum of 8,500 square miles. Reaching from modern day Walker Lake in the south to Carson Sink in the east and north to Black Rock Desert. Ancient shore lines can be seen throughout this MRLA and reach a maximum elevation of ~1330m (4365 feet) (Benson 1978). Slopes are typically less than 2 percent but may be as high as 10 percent in limited areas. Elevations are less than 1350m (4430 feet).
Soils: In general soils are alkaline and may be saline or sodic effected. Soils are considered saline when they have electrical conductivity (EC) of greater than 4 and pH over 8.5. Soil moisture regime is typic aridic and soil temperature regime is mesic

Climate: The basins of D27 are warmer and dryer than the surrounding area, effective precipitation is negative across this entire LRU. Mean annual air temperature ranges from 10 to 12 (F) and mean annual precipitation is less than 220mm. Frost free days typically range from 147 to 173 annually but may be as high as 185.

Biological characteristics: This LRU is characterized by salt desert shrub vegetation. Dominant species include shadscale (Atriplex confertifolia), Bailey's greasewood (Sarcobatus vermiculatus var. baileyi), black greasewood (Sarcobatus vermiculatus), Indian ricegrass (Achnatherum hymenoides), inland saltgrass (Distichlis spicata) and basin wildrye (Leymus cinerus).

Ecological site concept

The flood plain site has soils formed in alluvium. The slopes are less than 2 percent. The elevation is less than 1350 meters (4429 feet). The soil is moderately well drained and has a irregular decrease in organic matter and less than 5 percent clay. The site does not experience long duration ponding. The flood plain site has a sodium absorption ration of less than 13. The seasonal water table is within 100 to 150 centimeters (39 to 60 inches). The flood plain site does occasionally flood. Dominant plants in reference condition are Fremont cottonwood (Populous fremontii), willows (Salix spp.), and beardless wildrye (Leymus triticoides). The Flood Plain site was formerly known as Populus fremontii/Salix/Leymus triticoides-Pascopyrum smithii.

Associated sites

R027XY002NV	**MOIST FLOODPLAIN** The Moist Floodplain is found on landforms with a higher water table.
R027XY005NV	**SALINE MEADOW** The Saline Meadow site is found on similar landforms but with a greater influence of salts in the soil profile.
R027XY001NV	**WETLAND** The Wetland site is found on lower adjacent landforms and has a higher water table.

Similar sites

R027XY002NV	**MOIST FLOODPLAIN** The Moist Floodplain is found on landforms with a higher water table.

Table 1. Dominant plant species

Tree	(1) *Populus fremontii*
Shrub	(1) *Salix*
Herbaceous	(1) *Leymus triticoides* (2) *Pascopyrum smithii*

Physiographic features

The Flood Plain site occurs on axial-stream flood plains and point bars. Slopes gradients are from 0 to 2 percent. Elevations are 3700 to 4500 feet.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Point bar
Runoff class	Very low to negligible
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	1,128–1,372 m
Slope	0–2%
Water table depth	99–152 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 4 to 10 inches with most occurring during the winter months. Mean annual air temperature is 48 to 54 degrees F. The average growing season is 100 to 150 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	101-131 days
Freeze-free period (characteristic range)	131-176 days
Precipitation total (characteristic range)	127 mm
Frost-free period (actual range)	99-145 days
Freeze-free period (actual range)	125-192 days
Precipitation total (actual range)	127 mm
Frost-free period (average)	117 days
Freeze-free period (average)	155 days
Precipitation total (average)	127 mm

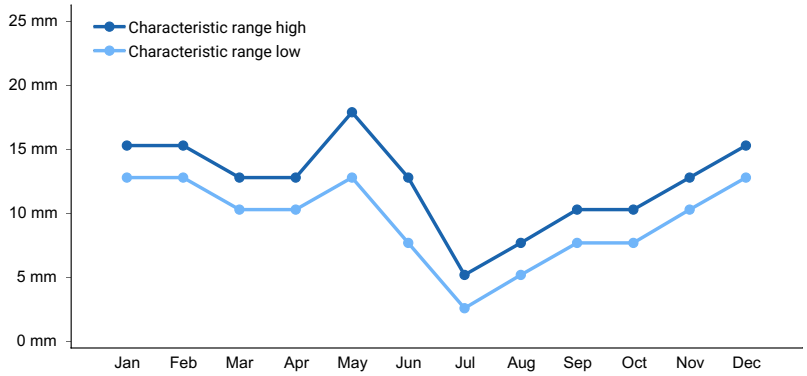


Figure 1. Monthly precipitation range

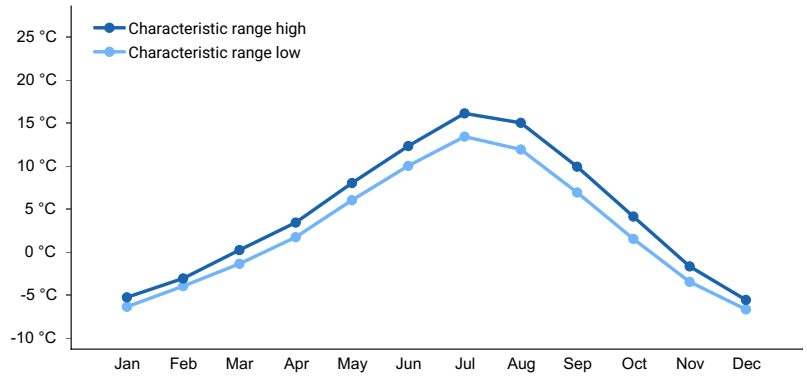


Figure 2. Monthly minimum temperature range

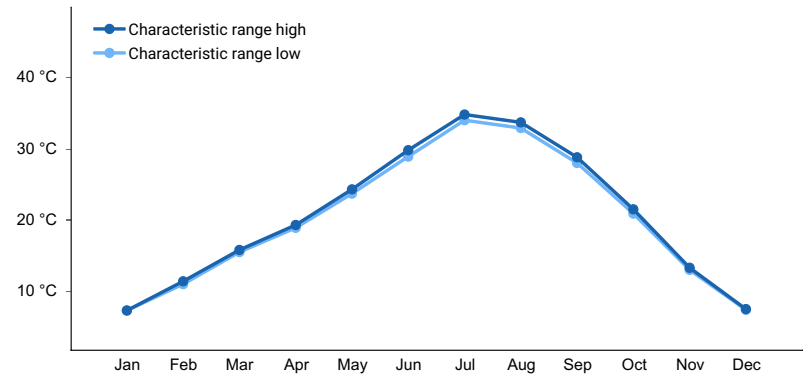


Figure 3. Monthly maximum temperature range

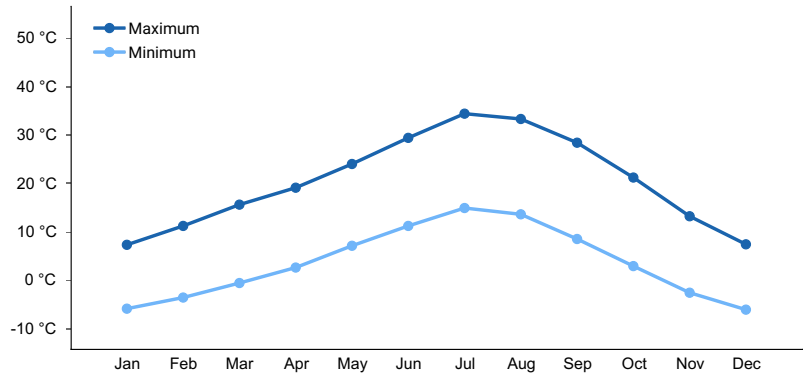


Figure 4. Monthly average minimum and maximum temperature

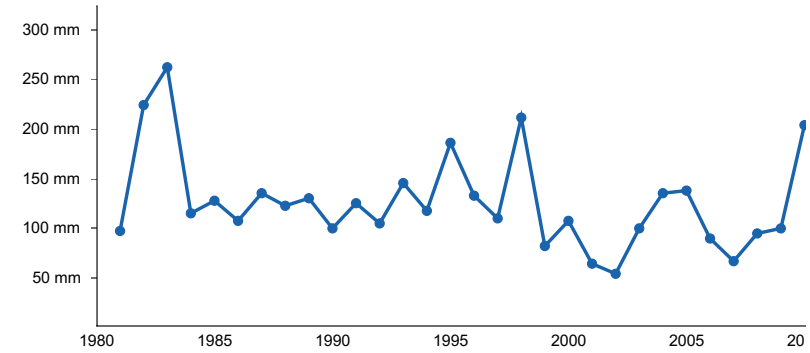


Figure 5. Annual precipitation pattern

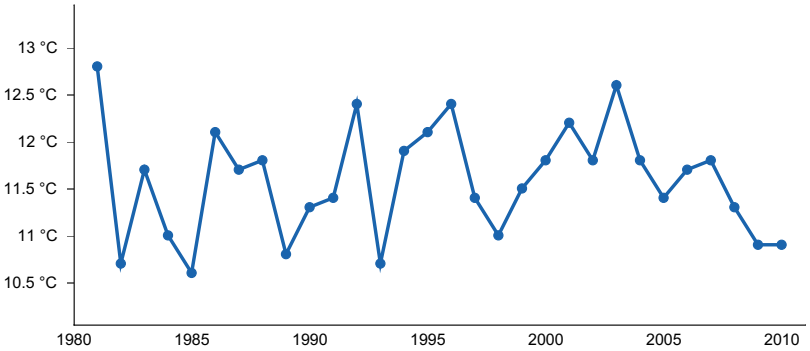


Figure 6. Annual average temperature pattern

Climate stations used

- (1) FALLON EXP STN [USC00262780], Fallon, NV
- (2) LAHONTAN DAM [USC00264349], Fallon, NV
- (3) WADSWORTH 4 N [USC00268838], Wadsworth, NV

Influencing water features

This site is influenced by flooding from adjacent perennial streams.

Soil features

The soils associated with this site are very deep, moderately well drained, and have rapid permeability. They have formed in alluvium derived from mixed igneous rocks, such as granodiorite and andesite. These soils are rarely to occasionally flooded during the late winter and early spring. Endosaturation is present with an apparent seasonal high water table between 3 and 5 feet from February through September. The soil moisture control section is usually dry in summer and fall and moist in winter and spring. The moisture regime is aridic bordering on xeric and the temperature regime is mesic. The soil series associated with this site include: Carwalker (NV602: 7302, 7303; NV603: 134, 223, 224, 225, 226, 227, 228, 230, 232, 233, 234, 236; NV625: 7071, 7104; NV628: 236; NV761: 7302; NV769: 7302; NV772: 223; NV774: 631, 4200) and Numana (NV603 and NV628: 237).

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous and sedimentary rock
Surface texture	(1) Extremely gravelly loamy sand (2) Sand
Family particle size	(1) Sandy
Drainage class	Moderately well drained
Permeability class	Moderately rapid to rapid
Soil depth	183–213 cm

Surface fragment cover <=3"	3–50%
Surface fragment cover >3"	1–15%
Available water capacity (0-101.6cm)	5.08–7.11 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	3–55%
Subsurface fragment volume >3" (Depth not specified)	1–10%

Ecological dynamics

Riparian areas are a productive and resilient portion of the landscape, exhibiting vegetative or physical attributes reflective of the influence of water. In riparian systems, there is typically inherent disturbance and change in the environment. It is not uncommon for physical conditions to change dramatically; often in relatively short periods. These changes might include: flooding (either temporarily or more long term); deposition of sediment on banks and across floodplains; accumulation of organic material; dewatering of a site; and changes in actual channel location. Each of these physical processes can change the associated vegetation. The vegetation, or lack of it, may contribute to each of the above phenomena. The physical characteristics of the site strongly affect the presence and location of riparian community types and resiliency of sites following natural and human-induced perturbation.

Fire Ecology:
Wildland fires appear to have been infrequent in riparian communities dominated by Fremont cottonwood prior to invasion by saltcedar. Fremont cottonwoods are not fire dependent and historical fire regimes for Fremont cottonwood-dominated riparian zones bordering drier ecosystems are poorly described. Fire scars are rare on Fremont cottonwood and when found, usually have such extensive heartrot that the tree's fire history cannot be reconstructed. Fire impacts vary proportionally with the severity and extent of burning in the catchment and are affected by the stream size. Mature Fremont cottonwood trees, willows and Wood's rose are typically top-killed by fire. The cambium layer of cottonwoods is damaged by even low-severity surface fire, however, Fremont cottonwood will resprout from the root crown after fire or other injury. Coppice sprouting is the predominant mechanism of vegetative reproduction in most areas. Fire thins the overstory and surrounding vegetation, allowing light to penetrate, and exposes mineral soil which cottonwood seedlings need. Fremont cottonwood is a shade-intolerant pioneer that typically establishes on freshly exposed alluvium, sand or gravel bars, streambanks, or other floodplain sites.
Coyote willow readily resprouts from roots, root crowns, and basal stems after fire. It is among the first species to appear following fire. Creeping wildrye is top-killed by fire. Creeping wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions. The major adaptation of western wheatgrass to fire is its rhizomatous growth form. During a fire the coarse culms usually burn fast with little or no heat transferred to the roots. Sedge is top-killed by fire, with rhizomes protected by insulating soil. The rhizomes of sedge species may be killed by high-severity fires that remove most of the soil organic layer. Reestablishment after fire occurs by seed establishment and/or rhizomatous spread. Streambank wheatgrass is quite tolerant of fire. Subsurface growing points and primarily rhizomatous reproduction may explain its ability to increase rapidly (within 2-5 years) following burning. Bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur.

Major Successional Stages of Forest Development:

HERBACEOUS: Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as insect damage, disease damage or tree harvest. Residual trees left following disturbance have little or no affect on the composition and production of herbaceous vegetation.

SHRUB-HERBACEOUS: Herbaceous vegetation and woody shrubs dominate the site. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a major component of the vegetal structure.

SAPLING: In the absence of disturbance, the tree seedlings develop into saplings (20 inches to 4½ feet in height) with a range in canopy cover of about 5 to 20 percent. Vegetation consists of grasses, forbs and shrubs in association with tree saplings.

POLE STAGE: As the canopy closes, trees stratify into crown classes quickly despite genetic uniformity within clones. Cottonwood stands are self-thinning, especially at young ages. This stage is characterized by rapid growth of the cottonwood trees, both in height and canopy. The visual aspect and vegetal structure are dominated by cottonwood trees ranging from about 10 to 20 feet in height, and having a diameter at breast height (DBH) of about 3 to 8 inches. Understory vegetation is moderately influenced by a tree canopy of about 15 to over 25 percent.

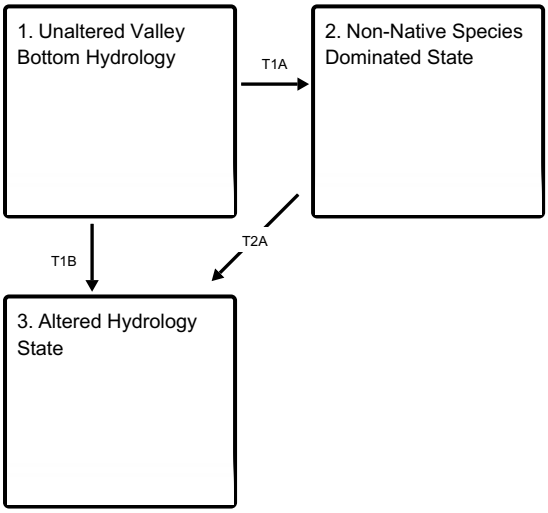
IMMATURE FOREST: The visual aspect and vegetal structure are dominated by Fremont's cottonwood greater than 4½ feet in height. Seedlings and saplings are present in the understory. Understory vegetation is moderately influenced by a tree overstory canopy of about 10 to 20 percent.

MATURE FOREST: The visual aspect and vegetal structure are dominated by cottonwood that have reached or are near maximal heights for the site. Tree canopy cover ranges from 40 to 65 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few seedlings and/or saplings of cottonwood occur in the understory.

OVER-MATURE FOREST: In the absence of naturally occurring disturbances, the tree canopy on this site can become very dense. This stage is dominated by Fremont's cottonwood that have reached maximal heights for the site. Understory vegetation is sparse due to tree competition, overstory shading, duff accumulation, etc. Tree canopy cover is commonly greater than 70 percent.

State and transition model

Ecosystem states

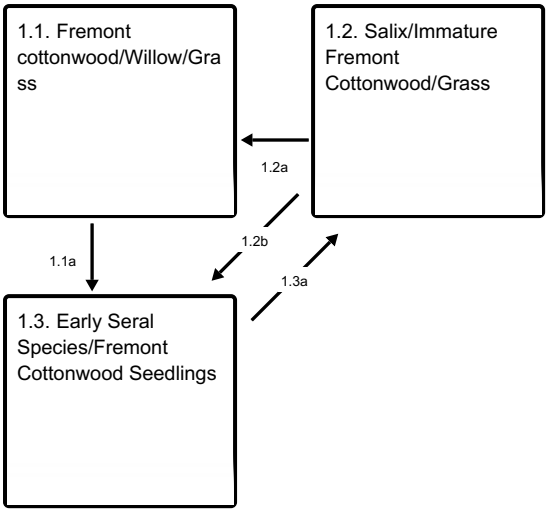


T1A - T1A - Introduction of non-native species.

T1B - T1B - altered hydrology

T2A - T2A - Altered hydrology

State 1 submodel, plant communities



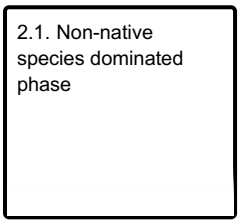
1.1a - 1.1a - disturbance, such as flooding

1.2a - 1.2a - recovery time

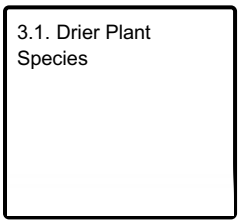
1.2b - 1.2b - disturbance, such as flooding

1.3a - 1.3a - recovery time

State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Unaltered Valley Bottom Hydrology

The Flood Plain site is found adjacent to streams in alluvial valley bottoms. The Flood Plain site experiences regular seasonal flooding, typically with surrounding mountain snowmelt in the spring. This regular flooding influences sediment deposition and plant community dynamics on the Flood Plain site by depositing fresh wet sediment where cottonwood seedlings can establish. The reference state has three community phases that represent disturbance and recovery in a hydrologically unaltered valley bottom. Community Phase 1.1 represents the plant community that has developed over time with out further flooding disturbance. It contains mature cottonwood trees and a developed shrub and grass understory. Community Phase 1.2 represents the immature and sapling cottonwood community. Community Phase 1.3 represents the site following fresh sediment deposition with early seral plant species and cottonwood seedlings present.

Characteristics and indicators. Unaltered hydrology on the site. No non-native species present.

Resilience management. Continued seasonal flooding in the flood plain is essential in maintaining the Flood Plain site in reference condition.

Dominant plant species

- Fremont cottonwood (*Populus fremontii*), tree
- willow (*Salix*), shrub
- beardless wildrye (*Leymus triticoides*), grass

Community 1.1
Fremont cottonwood/Willow/Grass

The reference plant community is dominated by Fremont's cottonwood. Fremont's cottonwood is the principal understory tree. Willows and Wood's rose are the principal understory shrubs. Creeping wildrye, western wheatgrass, inland saltgrass and rushes and sedges are the most prevalent understory grasses and grass-like plants. An overstory canopy of 40 to 65 percent is assumed to be representative of tree dominance on this site in the pristine environment. Overstory tree canopy composition is 100 percent Fremont cottonwood.

Forest overstory. MATURE FOREST: The visual aspect and vegetal structure are dominated by cottonwood that have reached or are near maximal heights for the site. Tree canopy cover ranges from 40 to 65 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few seedlings and/or saplings of cottonwood occur in the understory.

Forest understory. Understory vegetative composition is about 75 percent grasses and grass-like plants, 10 percent forbs, 10 percent shrubs and up to 5 percent trees when the average overstory canopy is medium (40 to 65 percent). Average understory production ranges from 2000 to 3500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4½ feet of the ground surface.

Dominant plant species

- Fremont cottonwood (*Populus fremontii*), tree
- willow (*Salix*), shrub
- beardless wildrye (*Leymus triticoides*), grass

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1681	2522	2942
Shrub/Vine	224	336	392
Forb	224	336	392
Tree	112	168	196
Total	**2241**	**3362**	**3922**

Community 1.2
Salix/Immature Fremont Cottonwood/Grass

Community Phase 1.2 represents the developing plant community over time. The dominant plants are willows, grasses, and immature Fremont Cottonwood.

Community 1.3
Early Seral Species/Fremont Cottonwood Seedlings

Community Phase 1.3 represents the plant community following scour and deposition of sediment from the adjacent stream channel. The community is dominated by species that are short lived and were deposited after flooding or rhizomatous species.

Pathway 1.1a
Community 1.1 to 1.3

Disturbance, such as fire to remove overstory trees and shrubs or large flood event that scours and deposits fresh sediment.

Pathway 1.2a
Community 1.2 to 1.1

Plant community continues to develop over time with lack of disturbance to remove tree canopy.

Pathway 1.2b
Community 1.2 to 1.3

Disturbance such as scour from flood or fire. The disturbance removes the tree and shrub canopy.

Pathway 1.3a
Community 1.3 to 1.2

Community development over time with lack of disturbance.

State 2
Non-Native Species Dominated State

Non-native species such as tamarisk are dominant in the Non-Native Species Dominated State. Non-native species (example Tamarix spp.) Tamarisk (Tamarix spp.) readily invades moist valley bottoms on flood plain and terrace landforms. Tamarisk changes the depositional dynamics when the associated channel has overbank floods. Deposition can increase and narrow the stream channel and create deeper bank, which then reduces overbank flooding over time, reducing the amount of disturbance on the flood plain, which alters the plant community dynamics.

Characteristics and indicators. Dominance of non-native species.

Community 2.1
Non-native species dominated phase

Community Phase 2.1 is dominated by non-native species.

State 3
Altered Hydrology State

The Altered Hydrology State is typically accompanied by channelization of the stream channel. Channelization alters the relationship between fluvial landforms and the adjacent stream channel and water table. The water table is often lowered and restricted to a narrower area directly around the stream channel. Channelization also reduces the timing, frequency, and magnitude of floods that keep the fluvial landforms in a state of dynamic equilibrium. Irrigation withdrawals from the channel with or without channelization also reduce the connection between fluvial landforms and the local water table.

Community 3.1
Drier Plant Species

Community Phase 3.1 is often dominated by plant species that are tolerant of drier soil conditions.

Transition T1A
State 1 to 2

Introduction of non-native species (example Tamarix spp.). Tamarisk (Tamarix spp.) readily invades moist valley bottoms on flood plain and terrace landforms. Tamarisk changes the depositional dynamics when the associated channel has overbank floods. Deposition can increase and narrow the stream channel and create deeper bank, which then reduces overbank flooding over time, reducing the amount of disturbance on the flood plain, which alters the plant community dynamics.

Transition T1B
State 1 to 3

Altered hydrology of the valley bottom through channelization of the stream channel. Channelization alters the relationship between fluvial landforms and the adjacent stream channel and water table. The water table is often lowered and restricted to a narrower area directly around the stream channel. Channelization also reduces the timing, frequency, and magnitude of floods that keep the fluvial landforms in a state of dynamic equilibrium. Irrigation withdrawals from the channel after channelization also reduce the connection between fluvial landforms and the local water table.

Constraints to recovery. Altered subsurface hydrology. Reconfiguration of the stream channel into an narrow channelized water conveyance. Altered surface hydrology.

Transition T2A
State 2 to 3

Altered hydrology of the valley bottom through channelization of the stream channel. Channelization alters the relationship between fluvial landforms and the adjacent stream channel and water table. The water table is often lowered and restricted to a narrower area directly around the stream channel. Channelization also reduces the timing, frequency, and magnitude of floods that keep the fluvial landforms in a state of dynamic equilibrium. Irrigation withdrawals from the channel after channelization also reduce the connection between fluvial landforms and the local water table.

Constraints to recovery. Altered water table dynamics. Reconfiguration of the stream channel into an narrow channelized water conveyance. Altered surface hydrology.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			1009–2018	
	beardless wildrye	LETR5	*Leymus triticoides*	336–807	–
	western wheatgrass	PASM	*Pascopyrum smithii*	168–303	–
	bluegrass	POA	*Poa*	168–303	–
	sedge	CAREX	*Carex*	168–303	–
	thickspike wheatgrass	ELLA3	*Elymus lanceolatus*	168–303	–
2	**Secondary Perennial Shrubs**			101–504	
	saltgrass	DISP	*Distichlis spicata*	34–168	–
	rush	JUNCU	*Juncus*	34–168	–
	basin wildrye	LECI4	*Leymus cinereus*	34–168	–
Forb					
3	**Perennial**			118–437	
	ragwort	SENEC	*Senecio*	34–168	–
	clover	TRIFO	*Trifolium*	34–168	–
	common yarrow	ACMI2	*Achillea millefolium*	17–34	–
	horsetail	EQUIS	*Equisetum*	17–34	–
	dock	RUMEX	*Rumex*	17–34	–
Shrub/Vine					
4	**Primary Shrubs**			168–303	
	willow	SALIX	*Salix*	168–303	–
5	**Secondary Shrubs**			34–168	
	Woods' rose	ROWO	*Rosa woodsii*	34–168	–
Tree					
6	**Deciduous**			34–168	
	Fremont cottonwood	POFR2	*Populus fremontii*	34–168	–

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing during the summer and fall. Livestock will often concentrate on this site taking advantage of the shade and shelter offered by the tree overstory. Harvesting trees under a sound management program for fuelwood, posts or other products can open up the tree canopy to allow increased production of understory species desirable for grazing.

Stocking rates vary with such factors as kind and class of grazing animal, season of use and fluctuations in climate. Actual use records for individual sites, a determination of the degree to which the sites have been grazed, and an evaluation of trend in site condition offer the most reliable basis for developing initial stocking rates.

The forage value rating is not an ecological evaluation of the understory as is the range condition rating for rangeland. The forage value rating is a utilitarian rating of the existing understory plants for use by specific kinds of grazing animals.

Wildlife Interpretations:
This site provides valuable habitat to mule deer during the summer. It furnishes ideal habitat for a variety of tree and ground nesting birds. Beaver can be sustained by the trees on this site. It is also used by various small mammals and reptiles and their associate predators natural to the area.

Recreational uses

Aesthetic value is derived from the rich hues and textures of the trees, particularly in the fall. The diverse floral and faunal composition and the colorful flowering of wildflowers during the summer enhance the beauty of this site. The site offers rewarding opportunities to photographers and for nature study. It has high value for hunting, camping, picnicking and family wood gathering.

Wood products

Fremont's cottonwood has been used for lumber, fence posts, and fuelwood. This tree has a considerable potential for increased utilization. It makes excellent pulp. Some of this wood is used for the production of excelsior, door corestock and boxwood.

PRODUCTIVE CAPACITY

This site is of medium quality for tree production. Site index ranges from about 65 to 75 (Baker & Broadfoot, 1977).

Productivity class: 4
CMAI*: 56 to 67 ft3/ac/yr
3.6 to 4.7 m3/ha/yr
*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.
Saw timber: 200 to 300 board-feet per acre.

Fuelwood Production: About 8 to 10 cords per acre. Firewood is commonly measured by cords, or a stacked unit equivalent to 128 cubic feet. Solid wood volume in a cord varies but usually ranges from 65 to 90 cubic feet. Assuming an average of 75 cubic feet of solid wood volume per cord, there are about 15 million British Thermal Units (BTUs) heat value in a cord of cottonwood firewood.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS
a. Potential for sheet erosion is low.
b. Moderate to severe equipment limitations on wet soils.
c. Proper spacing is the key to a well managed, multiple use and multi-product Fremont's cottonwood forestland.

2. ESSENTIAL REQUIREMENTS
a. Adequately protect from high intensity wildfire.
b. Protect soils from accelerated erosion.
c. Apply proper grazing management.

3. SILVICULTURAL PRACTICES
a. Harvest cut selectively or in small patches (size dependent upon site conditions) to enhance forage production.
1) Thinning and improvement cutting - Removal of poorly formed, diseased and low vigor trees for fuelwood.
2) Harvest cutting - Selectively harvest surplus trees to achieve desired spacing. Harvest stands in small blocks of 1/5 to 1/2 acre with slash left in place to shelter emerging seedlings from browsing.
3) Selective Tree Removal - Remove selected trees on suitable sites to enhance forage production and manage site reproduction.
4) Spacing Guide - A spacing of about 15 X 15 feet at stand maturity is considered desirable for multiple use management.
c. Pest control - Use necessary and approved control for specific pests and diseases.
d. Fire hazard - Fire is rarely a significant problem in Fremont's cottonwood stands. However, even a light fire may kill cottonwood seedlings, saplings and mature trees.

Other products

Native Americans ate the inner bark of Fremont cottonwood for antiscorbutic. The bark and leaves were used to make poultices to relieve swelling, treat cuts, cure headaches, and wash broken limbs, and to treat saddle sores

and swollen legs of horses. Native Americans used the leaves of willows to treat mosquito bites, bee stings and stomach aches and used to stems for implements such as baskets, arrow shafts, scoops and fish traps.

Other information

Fremont cottonwood's rapid early growth makes it well suited for revegetating riparian sites. It has been recommended for revegetating areas where invasive saltcedar has been removed. Fremont cottonwood, along with willows and other native plants, has also been used to restore, enhance, or create bird habitat in riparian areas. Willow is useful in stabilizing streambanks and providing erosion control on severely disturbed sites. It is valuable in revegetating disturbed riparian sites having high water tables and low elevations. Creeping wildrye is primarily used for reclamation of wet, saline soils. Western wheatgrass is a good soil binder and is well suited for reclamation of disturbed sites.

Table 7. Representative site productivity

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
Fremont cottonwood	*POFR2*	65	75	56	67	–	–	–	

Inventory data references

NASIS data for Carwalker and Numana in soil surveys NV602, NV603, NV625, NV628, NV761, NV769, and NV722.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T12 R70 S18
UTM zone	N
UTM northing	746313
UTM easting	4310898
Latitude	38° 54′ 44″
Longitude	114° 9′ 33″
General legal description	Along Carson River floodplain, Lahontan State Park, Churchill County. This site also occurs in Lyon, Mineral, Pershing and Storey Counties, Nevada.

Other references

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Contributors

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Approval

Kendra Moseley, 6/03/2024

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	06/03/2024
Approved by	Kendra Moseley
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:**